APPENDIX A

List of Community Environmental Partnership (CEP) Air Committee Members

REGULAR AIR COMMITTEE MEMBERS

NAME	ORGANIZATION
Richard Anderson	Concerned Citizens for a Better Brooklyn (CCBB)
Caroline Bahr	Enoch Pratt Library
Delores Barnes	Concerned Citizens for a Better Brooklyn (CCBB)
Rebecca Besson	Delta Chemical Corp.
John Besson	Delta Chemical Corp.
Ann Bonenberger	Concerned Citizens for a Better Brooklyn (CCBB)
Clarice Brown	Southern Neighborhood Service Center
Peter Conrad	Baltimore City Planning Department
Francis Croft	Sierra Club
Ruben Dagold	Baltimore City Health Department
Stephen Dyer	Grace Davison
Steve Farkas	Baltimore Gas & Electric (BGE)
Randy Gaul	Resident
Matt Gillen	U.S. EPA
Terry Harris	Sierra Club
Reginald Harris	U.S. EPA
Albert Hayes	U.S. EPA
Ed Looker	Resident
David Lynch	U.S. EPA
*Dave Mahler	Condea Vista
*Doris McGuigan	Ministerial Alliance/Maryland Waste Coalition
Richard Montgomery	Phoenix Services
Allen Morris	CITGO
Charles Nardiello	Arundel Corporation
William Paul	MDE/ARMA
John Quinn	Baltimore Gas & Electric (BGE)
Rev. R. Andrews	Brooklyn United Methodist Church
Pars Ramnarain	MDE/ARMA
Hank Topper	U.S. EPA
Don Torres	Baltimore City Health Department
Michael Trush	Johns Hopkins School of Hygiene & Public Health

* Co-Chairs

APPENDIX B

Letters from Partnership

CLEANUP COALITION

July 14, 1998

The Honorable Lynn Goldman
Assistant Administrator
U.S. EPA
401 M St. SW
Washington, D.C. 20642

Michael McCabe
Regional Administrator
U.S. EPA
841 Chestnut Building
Philadelphia, PA 19107

Re: Environmental Partnership Program in South Baltimore

Dear Mr. McCabe and Ms. Goldman:

We are writing with regret to inform you that after two years and many hours of work, we have decided that we can no longer participate in the Environmental Partnership Program in South Baltimore. We count ourselves among the founders of this important project and we have reached this conclusion only after considerable deliberation and a sincere effort to salvage this troubled effort. We explain our reasons in some detail below, in the hopes that they will help EPA redesign similar initiatives.

We began this process deeply committed to the Partnership's ultimate goal: the discovery of more effective ways to reduce pollution through the reinvention of traditional regulatory programs. But along the way, after countless meetings where we tried repeatedly to pursue that objective, it became clear to us that other participants in the Partnership Program did not share this goal, but rather saw the effort as a vehicle for pursuing their own agendas. EPA, as the convener of this effort, must bear the responsibility for allowing this dissension to fester, never effectively leading the group to reach consensus on the overall purpose of the Partnership.

All of us have far too many opportunities to sit in rooms with people who disagree with us, arguing endlessly about who is right. We long ago learned the pat positions of our opponents and developed our own automatic responses. What we need -- and what we thought we would get from the Partnership when we first signed on -- was a real opportunity to get beyond rhetoric to results, developing a new and deeper understanding of the environmental conditions that threaten us and debating the best way to address those problems.

107 Scott St.*Baltimore, MD 21201*410 625 0559

The final straw came at the last meeting of the Air Subcommittee. Industry representatives, who at this point outnumber public interest representatives by a margin of three to one, informed us at great length that there is no serious pollution problem in South Baltimore and certainly no evidence that public health is suffering as a result of environmental contamination, as opposed to the individual lifestyle choices of our families, friends, and neighbors. In short, we were told that our concerns are fanciful and that we are sick because we smoke and drive automobiles. Life is just too short to spend being hectored in this manner.

The only redeeming feature of that meeting was a statement made by Reginald Harris, the EPA Region III representative to the Partnership. Mr. Harris made an effort to explain to our opponents why their arguments were unjustified and counterproductive. But this intervention, as much as we appreciated it, came too little and too late.

As we wrote you a year ago, the Environmental Partnership Program in South Baltimore failed for three distinct reasons: 1) the absence of tangible and specific goals and milestones; 2) a process that erects high barriers to effective citizen participation; and 3) a profound and systematic failure to communicate effectively by EPA line staff. Before you begin a similar effort elsewhere in the country, we hope that you will carefully consider these comments and not just move on, finding another group of unsuspecting citizens to participate in such a pointless exercise.

Sincerely,

Doris McGuigan
Maryland Waste Coalition
Cleanup Coalition

Terry Harris
Sierra Club
Cleanup Coalition

Ann Bonenberger
Maryland Waste Coalition
Concerned Citizens for a Better Brooklyn
Cleanup Coalition

Rose Hindla
Fairfield/Wagner's Point Neighborhood Coalition
Cleanup Coalition

Dru Schmidt-Perkins
League of Conservation Voters
Cleanup Coalition

Dan Pontious
MaryPIRG
Cleanup Coalition

cc: Senator Barbara Mikulski, Senator Paul Sarbanes, Governor Parris Glendening, Congressman Wayne Gilchrest, Senator George Della, Delegates Timothy Murphy and Brian McHale, Mayor Kurt Schmoke

Administrator Carol Browner, Deputy Administrator Fred Hansen, MDE Secretary Jane Nishida, EPA Division Director William Sanders, EPA Region III representative Reginald Harris

The Southern Baltimore & Northern Anne Arundel County
Community Environmental Partnership
Working Together to Improve our Communities
3606 Hanover Street Baltimore, MD 21225

The Honorable Lynn Goldman
Assistant Administrator
U.S. EPA
401 M St.. SW
Washington, D.C. 20542

Michael McCabe
Regional Administrator
U.S. EPA
841 Chestnut Building
Philadelphia, PA 19107

September 11, 1998

RE: Environmental Partnership in South Baltimore

Dear Mr. McCabe and Ms. Goldman:

This letter is a response to the July 14, 1998 letter from the Cleanup Coalition announcing their withdrawal from the Community Environmental Partnership Air Committee. We are concerned about this most recent attack on our organization, and we want you to know that those of us who are committed to the Partnership far out number the handful of Partnership members who signed the letter. Three of the individuals who signed the letter have never attended a meeting or been involved in the Partnership in a significant way. We are afraid that these individuals represent groups with an agenda to discredit the efforts of partnerships among residents, businesses and government officials. It appears to us that the Cleanup Coalition, despite their worthy goals, is more accustomed to maintaining an adversarial approach than to achieving positive results for the community. When positive and effective efforts like ours do not come up with results that support their adversarial approach, their only option seems to be to withdraw and write a letter. The approach of working together to create a win-win situation seems foreign to their way of thinking.

Both the current letter and last year's letter criticizing our Partnership were timed to appear on the day before our Air Committee was scheduled to finalize reports for the community. This is clearly not a coincidence. The members of the Cleanup Coalition appear to be willing to try to block the distribution of information important for our community's health. Their involvement in the process up to the finalizing of the committee's most recent report tends to discredit their current position. Perhaps they are opposing the report because the results do not appear to support their organizational agendas..

Members of the Cleanup Coalition are continuing their opposition to the new approach we have taken in the Community Environmental Partnership. We have tried to go beyond the adversarial approach and to build a partnership among all the sectors of our community. We are concerned about the continuing opposition to this approach. Such opposition makes it difficult for us to focus on positive community improvements. Valuable time and efforts has been spent responding to these concerns. We would like to be able to focus more upon building a stronger partnership that will help our community.

These are the facts about the Partnership:

The Partnership Air Committee and its draft report, contrary to the claims made, does not target individual life styles or blame community members for their health problems. The Partnership Air Committee has not, as claimed, spent endless hours in a wasted effort.

The Committee has completed one of the most comprehensive reviews of stationary source releases ever attempted and it has accomplished this with the voluntary participation of all sectors of the community. The Air Committee succeeded in pulling together a vast amount of information and has succeeded in answering questions about local air quality that the community has been asking for many years. The results of this work will give us a chance to be much more effective in targeting our ongoing efforts to improve the health of our community.

The three members of the Cleanup Coalition who participated in the Partnership worked with this committee and agreed with all of its major decisions up until their recent decision to withdraw.

The Partnership has harnessed a tremendous amount of volunteer effort to improve our communities. We have had hundreds of school children and parents participate in two major park clean ups and educationals.

We have had volunteer committee members spend countless hours working with state and federal officials to collect and interpret vital environmental information for the community.

The Partnership has organized pollution prevention, tenant rights, Internet and computer training, workshops on asthma, ozone, green business, it has continued positive efforts with Congressman Wayne Gilcrest to pursue a wildlife reserve in the area, and more recently has begun to help local residents find temporary employment.

The Partnership has succeeded in bringing a very broad range of organizations and individuals together to work in our communities. We have brought MDE, DPW, EPA, Johns Hopkins School of Public Health, University of Maryland School of Social Work, Chesapeake Bay Foundation, Save our Streams, Millennium, Chem Metals, FMC, Delta Chem, BFI, 4 H, Civic Works, hundreds of local middle, elementary and special educational and vocational children and their parents, Brooklyn Homes Tenants Association, the Police Athletic League, and others--all working together to find constructive solutions to community problems.

The Partnership has begun a major project to create a wildlife preserve and education center for our communities on the north Brooklyn shore. This project could help change the reputation of our neighborhoods and give our Region a priceless natural resource.

The Partnership has brought residents and industry together and opened up a broad community dialogue on important issues.

The Partnership has created an unprecedented partnership of City, County, State, and Federal governments and brought this partnership into the community to help us answer questions and solve problems. This has given us a rare chance to work side by side with our government agencies.

We hope that this partial list will convince you that our Partnership is doing important work, or, at least, convince you to find out more about us. We are determined to continue and to build on the work we have begun. We are proud of what we have accomplished and we are excited about our future plans. If you have any questions about our work, we encourage you to please take the time to find out as much as you can about our Community Environmental Partnership. We would like to schedule a meeting with you to further discuss our activities and plans. If you can't visit us, please give us a call at 410-354-0352.

Thank you for your support

Sincerely,

Executive Committee
Rev. Rick Andrews, Wanda Grimes, Dan Butler

cc: Senator Barbara Mikulski, Senator Paul Sarbanes, Governor Parris Gendening, Congressman Wayne Gilchrest, Senator George Della, Delegates Timothy Murphy and Brian McHale, Mayor Kurt Schmoke

Administrator Carol Browner, Deputy Administrator Fred Hansen, MDE Secretary Jane Nishida, EPA Division Director William Sanders, EPA Region III representative Reginald Harris

APPENDIX C

Sources for Facility Information

- **Envirofacts**
  - **TRI**
  - **FINDS (includes Dun & Bradstreet Numbers)**
  - **AIRS/AFS**

Envirofacts

Envirofacts Database:

Website Address: http://www.epa.gov/enviro/index_java.html

This website provides access to several EPA databases that provide you with information about environmental activities that may affect air, water, and land anywhere in the United States. The Environmental Protection Agency (EPA) created the Envirofacts Warehouse to provide the public with direct access to the wealth of information contained in its databases. The Envirofacts Warehouse allows you to retrieve environmental information from EPA databases on Air, Chemicals, Facility Information, Grants/Funding, Hazardous Waste, Risk Management Plans, Superfund, Toxic Releases, and Water Permits, Drinking Water, Drinking Water Contaminant Occurrence, and Drinking Water Microbial and Disinfection Byproduct Information (Information Collection Rule [ICR]). You may retrieve information from several databases at once, or from one database at a time. Online queries allow you to retrieve data from these sources and create reports, or you may generate maps of environmental information selecting from several mapping applications available through EPA's Maps On Demand.

You can also read about the spatial data used by the Maps On Demand mapping applications. The Locational Reference Tables contain all of the latitude and longitude coordinate information available through Envirofacts.

TRI

Toxics Release Inventory


Area TRI Report


Facility TRI Report


Industry TRI Report


Parent TRI Report


Offsite Transfer TRI Report

The Toxic Release Inventory (TRI) is a database of information about releases and transfers of toxic chemicals from manufacturing facilities. Facilities must report their releases of a toxic chemical to TRI if they fulfill four criteria:

1. They must be a manufacturing facility (primary SIC code in 20 -39);
2. They must have the equivalent of 10 full-time workers;
3. They must either manufacture or process more than 25,000 lbs of the chemical or use more than 10,000 lbs during the year;
4. The chemical must be on the TRI list of 350 specific toxic chemicals or chemical categories.

Therefore, not all, or even most, pollution is reported in TRI. However, T RI does have certain advantages:

1. It is multi-media. Facilities must report the amounts they release to air, land, water, and underground separately, and must report how much they send off-site;
2. All quantities are reported in pounds. This is an advantage compared to databases like PCS, which often report releases as concentrations, or other databases which report releases by volume of waste. These measures are often impossible to convert into pounds;
3. It is congressionally mandated to be publically available, by electronic and other means, to everyone. This means that it's relatively easy to obtain TRI data and that the data is well-known, becoming a national "yardstick" for measuring progress in pollution and waste generation.

The TRI data is reported by individual facilities, who send their reports to Federal EPA every year. These reports are filled out on a form called "Form R". EPA takes these forms and converts them into an electronic database . To better understand TRI data, it is recommended that you order a copy of one of these forms from the TRI Hotline (1-800-535-0202). You can also order (for free) a national "data release", or summary on paper, of TRI data every year from the Hotline.

FINDS (including Dun & Bradstreet)

FINDS Facility Index System


Area FINDS Report


Facility FINDS Report


Industry FINDS Report

FINDS data is a comprehensive listing of facilities regulated under a variety of EPA programs. The FINDS database provides some basic information about each facility and a listing of its ID numbers in other EPA databases. With these ID numbers, you know where to look for more information (if you can somehow get access to the other EPA databases.)

FINDS has both master records and alias records. A master record describes the most accurate information for a facility that is known to EPA. An alias record describes information for a facility as it appears in another EPA database. A single facility will have one master record and one or many alias records in FINDS.

The program will search both the master and alias records, unless you search specifically using a source program type in the Area report. Low detail searches will display only the master records; High detail adds the alias records. All that will be retreived in any case is the facility's name, address, and a few other identifiers -- that is all that is in FINDS.

Attribute: DUNS_NUM_CO

Definition:

The Data Universal Numbering System (DUNS) value which uniquely identifies a corporate entity.

This attribute is the primary key for the FND_COMPANY and FND_DUNS_SIC_CODE entity types and is the foreign key for the FND_FACILITY entity type.

Definition Source:

FINDS 4.0 Data Element Dictionary, September 22, 1994.

Security: Public

Source System: FINDS

- FINDS Table: FINDS_FACILITY_ALL
- Element: DUNS_NUM_COMPANY

Last Updated: 03/31/95

Remarks: ***The data in the FND_COMPANY and FND_DUNS_SIC_CODE tables is only available to those EPA users who have access to the internal Envirofacts database. Access to the data in this table is restricted to EPA users due to the Agency's licensing agreement with Dun and Bradstreet. The information about this attribute is provided for the use of the EPA users who wish to query the system. Outside users will not be able to access this table and will see an error message when they try to access this table.***

Properties: Mandatory Basic Text

- Length: 9
- Default: None.

Return to:

- FINDS Entity & Attribute Information
- Envirofacts Overview

AIRS/AFS

EPA United States Environmental Protection Agency

Office of Air Quality Planning & Standards OAQPS

TTNWeb Technology Transfer Network

AIRS Aerometric Information Retrieval System

Welcome to AIRS TTN

The Aerometric Information Retrieval System (AIRS) TTN web site is designed to provide technical information about the AIRS data management system primarily to AIRS users (state and local agency management, EPA Regional Offices, consultants, and environmental groups.)

We encourage you to visit the What's New page to learn about current happenings and events.

Main Table of Contents

This site is maintained by the Information Management Group (IMG) of theInformation Transfer and Program Integration Division (ITPID), Office of Air Quality andPlanning & Standards, US Environmental Protection Agency (US EPA).

EPA United States Environmental Protection Agency

Office of Air Quality Planning & Standards OAQPS

TTNWeb Technology transfer network

AIRS Aerometric Information Retrieval System

AIRS Facility Subsystem (AFS)

AFS contains emissions, compliance and permit data for stationary sources regulated by the U.S. EPA and state and local air pollution agencies. This information is used by states in preparation of State Implementation Plans (SIPs), to track the compliance status of point sources with various regulatory programs, and report emissions estimates for pollutants regulated under the Clean Air Act.

This site is designed to keep users of the system apprised of developments. For general background information about AFS and AIRS, see AIRS Basic Facts. EXIT TTN

To generate reports of AFS data (major point sources), see the AIRS*Data* EXIT TTN page.

If you are a user of AFS and need technical assistance, call 1-800-367-1044 or email AFSHELPLINE@TRCCOS.COM

AFS Table of Contents

APPENDIX D

Toxicity Information

- **EPA Region III Risk-Based Concentration Table**
- **MRLs (ATSDR)**
- **IRIS**
- **HEAST**

EPA Region III Risk-Based Concentration Table

EPA United States Environmental Protection Agency **Region 3**

Hazardous Site Cleanup Division

RISK ASSESSMENT

- **EPA Region III Risk-Based Concentration Table - October 1998 Update** (*Some files are in Portable Document Format, PDF, and you will need a PDF reader. You may download a free copy from the Web, supplied by Adobe Software or use a Reader of your choice. This link to Adobe is only provided as a convenience to you, and does not represent a product endorsement. Using this option will cause you to leave the EPA web site. You may return to this page by navigating through the BACK button on your browser.)*

  Background Information
  Updated Risk Based Concentration Table Cover Memo

  RBC Table- PDFfile
  RBC Table- Self-extracting Lotus 123 file (54k)
  RBC Table- Self-extracting Lotus WK4 file (57k)
  RBC Table- Self-extracting Excel file (76k);

- Use of Monte Carlo Simulation in Risk Assessments

- Selecting Exposure Routes and Contaminents of Concern by Risk-Based Screening

- EPA Region III Guidance on Handling Chemical Concentration Data Near the Detection Limit in Risk Assessments

- Assessing Dermal Exposure fromSoil

[EPA Home | Region 3 Home | HSCD | Search Region 3 | Comments]

URL: http://www.epa.gov/reg3hwmd/risk/riskmenu.htm
This page last updated on December 24, 1998

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Risk-Based Concentration Table **DATE:** 10/1/98

FROM: Jennifer Hubbard, Toxicologist
Superfund Technical Support Section (3HS41)

TO: RBC Table Users

Attached is the EPA Region III Risk-Based Concentration (RBC) Table, which we prepare and post periodically for all interested parties.

IMPORTANT NOTES: To make the RBC Table more accessible and to minimize paper usage, it is now primarily available through the Internet. The address is **http://www.epa.gov/reg3hwmd/risk/riskmenu.htm**. The Table is available in both Lotus and Excel as "self-extracting" files. These files should be downloaded and then processed with your computer's "run" function. The files can then be viewed in Lotus or Excel. If you have technical questions about the toxicological or risk assessment aspects of the RBCs, please contact Jennifer Hubbard at 215-814-3328 or hubbard.jennifer@epamail.epa.gov. Other questions can be addressed to Vanessa Sizer or Terri Fields at 215-814-3041. You can also consult the Frequently Asked Questions, below.

CONTENTS, USES, AND LIMITATIONS OF THE RBC TABLE

The RBC Table contains Reference Doses (RfDs) and Cancer Slope Factors (CSFs) for 400-500 chemicals. These toxicity factors have been combined with "standard" exposure scenarios to calculate RBCs--chemical concentrations corresponding to fixed levels of risk (i.e., a Hazard Quotient (HQ) of 1, or lifetime cancer risk of 1E-6, whichever occurs at a lower concentration) in water, air, fish tissue, and soil.

The Region III toxicologists use RBCs to screen sites not yet on the NPL, respond rapidly to citizen inquiries, and spot-check formal baseline risk assessments. The primary use of RBCs is for chemical screening during baseline risk assessment (see EPA Regional Guidance EPA/903/R-93-001, "Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening"). The exposure equations come from EPA's Risk Assessment Guidance for Superfund (RAGS), while the exposure factors are those recommended in RAGS or supplemental guidance from the Superfund program. The attached technical background document provides specific equations

and assumptions. Simply put, RBCs are like risk assessments run in reverse. For a single contaminant in a single medium, under standard default exposure assumptions, the RBC corresponds to the target risk or hazard quotient.

RBCs also have several important limitations. Specifically excluded from consideration are (1) transfers from soil to air and groundwater, 2) cumulative risk from multiple contaminants or media, and (3) dermal risk. Additionally, the risks for inhalation of vapors from water are based on a very simple model, whereas detailed risk assessments may use more detailed showering models. Also, the toxicity information in the Table has been assembled by hand and (despite extensive checking and years of use) may contain errors. It's advisable to cross-check before relying on any RfDs or CSFs in the Table. If you note any errors, please let us know.

It is important to note that this Table uses inhalation RfDs and CSFs rather than RfCs and inhalation unit cancer risks. This is because the latter factors incorporate exposure assumptions and therefore can only be used for one exposure scenario. Because risk assessors need to evaluate risks for many types of scenarios, the factors have been converted to the more traditional RfDs and CSFs. Unless otherwise indicated in the toxicity-factor source, the assumption is that RfCs and unit risks should be adjusted by a 70-kilogram body weight and a 20 m^3/day inhalation rate to generate the RfDs and CSFs.

Many users want to know if the RBCs can be used as valid no-action levels or cleanup levels, especially for soils. The answer is a bit complex. First, it is important to realize that the RBC Table does not constitute regulation or guidance, and should not be viewed as a substitute for a site-specific risk assessment. For sites where:

1. A single medium is contaminated;

2. A single contaminant contributes nearly all the health risk;

3. Volatilization, leaching, dermal contact, and other pathways not included in the RBCs are not expected to be significant;

4. The exposure scenarios and assumptions used in the RBC table are appropriate for the site;

5. The fixed risk levels used in the RBC table are appropriate for the site; and

6. Risk to ecological receptors is not expected to be significant;

the RBCs would probably be protective as no-action levels or cleanup goals. However, to the extent that a site deviates from this description, as most do, the RBCs would not necessarily be appropriate.

To summarize, the Table should generally not be used to set cleanup or no-action levels at

CERCLA sites or RCRA Corrective Action sites, to substitute for EPA guidance for preparing baseline risk assessments, or to determine if a waste is hazardous under RCRA.

SPECIAL NOTES

The RBC Table was originally developed by Roy L. Smith, Ph.D., for use by risk assessors in the Region III Superfund program. Dr. Smith is no longer with Region III, and the Table continues to evolve. You may notice some modifications of formatting and conventions used in the Table.

For instance, besides formatting, the following changes are noteworthy:

- As usual, updated toxicity factors have been used wherever available. However, because IRIS and provisional values are updated more frequently than the RBC Table, RBC Table users are ultimately responsible for obtaining the most up-to-date values. The RBC Table is provided as a convenience, but toxicity factors are compiled from the original sources and it is those original sources that should serve as the definitive reference.

- Certain outdated and withdrawn numbers have been removed from the Table.

- BACK BY POPULAR DEMAND: Changes to the table have been marked with asterisks (**). This was the most commonly requested feature over the last six months. Changes may involve a corrected CAS number or a correction in the VOC status, or they may reflect changes of RfDs and CSFs on IRIS.

- RBCs are no longer rounded to 1E6 ppm. For certain low-toxicity chemicals, the RBCs exceed possible concentrations at the target risks. In such cases, Dr. Smith rounded these numbers to the highest possible concentration, or 1E6 ppm. The rounding has been discontinued so that Table users can adjust the RBCs to a different target risk whenever necessary. For example, when screening chemicals at a target HQ of 0.1, noncarcinogenic RBCs may simply be divided by 10. Such scaling is not possible when RBCs are rounded.

- This Table was originally compiled to assist Superfund risk assessors in screening hazardous waste sites. The large number of chemicals made the Table unwieldy and difficult to keep current. Many of the chemicals did not typically (or even occasionally) appear at Superfund sites. Starting with the April 1998 version of the Table, the 600+ chemicals were reduced to some 400-500 chemicals by eliminating many of those atypical chemicals. Through time, the Table may continue to grow or decrease in size. Comments on this issue are appreciated. During the last six months, only one request was received for restoration of a chemical: NuStar has been restored to the Table. (A list of the deleted chemicals is attached.)

- At Region III Superfund sites, noncancer RBCs are typically adjusted downward to correspond to a target HQ of 0.1 rather than 1. (This is done to ensure that chemicals with

additive effects are not prematurely eliminated during screening.) However, some chemicals have RBCs at HQs of 0.1 that are lower than their RBCs at 1E-6 cancer risk. In other words, the screening RBC would change from carcinogenic to noncarcinogenic. A new feature of this Table is that these chemicals are now flagged with a "!" symbol. Therefore, assessors screening with adjusted RBCs will be alerted to this situation.

- Earlier versions of this Table included a substitution of inhalation toxicity factors for oral factors whenever oral factors were unavailable (this applied only to groundwater and air, but not soil or fish). This practice has been discontinued in order to minimize the uncertainty associated with such a conversion. The discontinuation of this practice does not significantly decrease the number of available RBCs.

- CAS numbers and volatility status have begun to be re-checked in accordance with comments from users. At this time, 85% of the chemicals have been checked for volatility, and about 99% of the CAS numbers have been verified.

- Earlier versions of this Table included soil screening levels (SSLs), when those values were available in draft form. Since the finalization of the SSL Guidance, risk assessors are urged to consult the final SSL Guidance directly. The Guidance has detailed recommendations on site-specific sampling and site-specific SSL generation. (Soil Screening Guidance: User's Guide, April 1996, Publication 9355.4-23; and Soil Screening Guidance: Technical Background Document, May 1996; EPA/540/R-95/128)

- One user of the Table pointed out that the CAS numbers do not contain the dashes that are part of their format. CAS numbers have always appeared on the Table without dashes, but may be converted to their dashed form by placing a dash before the last number (farthest to the right), then moving two places to the left and placing another dash. For example, "107131" becomes "107-13-1"; "7440360" becomes "7440-36-0"; "25057890" becomes "25057-89-0." Region III could add the dashes directly to the Table, but we do not wish to make this change without feedback from users on whether this would adversely affect them. Therefore, we are soliciting comments on this issue (see box on first page for address).

FREQUENTLY ASKED QUESTIONS

To help you better understand the RBC Table, here are answers to our most often-asked questions:

1. How can the age-adjusted inhalation factor (11.66) be less than the inhalation rate for either a child (12) or an adult (20)?

   Age-adjusted factors are not intake rates, but rather partial calculations which have different units from intake rates. (Therefore, they are not directly comparable.) The fact that these partial calculations have values similar to intake rates is really coincidental, an

artifact of the similar magnitude of years of exposure and time-averaged body weight.

2. For manganese, IRIS shows an oral RfD of 0.14 mg/kg/day, but the RBC Table uses 2E-2 mg/kg/day. Why?

The IRIS RfD includes manganese from all sources, including diet. The explanatory text in IRIS recommends using a modifying factor of 3 when calculating risks associated with non-food sources, and the Table follows this recommendation. IRIS also recommends subtracting dietary exposure (default assumption in this case 5 mg). Thus, the IRIS RfD has been lowered by a factor of 2 x 3, or 6. The Table now reflects manganese RBCs for both "food" and "non-food" (most environmental) sources.

3. What is the source of the child's inhalation rate of 12 m^3/day?

The calculation comes from basic physiology. It's a scaling of the mass-specific 20 m^3/day rate for adults from a body mass of 70 kg to 15 kg, using the 2/3 power of mass, as follows:

Ircm = mass-specific child inhalation rate (m^3/kg/day)
Irc = child inhalation rate (m^3/day)

20 m^3/day / 70 kg = 0.286 m^3/kg/day (mass-specific adult inhalation rate)

0.286 m^3/kg/day x $(70^{0.67})$ = (Ircm) x $(15^{0.67})$

Ircm = 0.803 m^3/kg/day

Irc = Ircm x 15 kg = 0.803 m^3/kg/day x 15 kg = 12.04 m^3/day

4. Can the oral RfDs in the RBC Table be applied to dermal exposure?

Not directly. Oral RfDs are usually based on administered dose and therefore tacitly include a GI absorption factor. Thus, any use of oral RfDs in dermal risk calculations should involve removing this absorption factor. Consult the Risk Assessment Guidance for Superfund, Part A, Appendix A, for further details on how to do this.

5. The exposure variables table in the RBC background document lists the averaging time for non-carcinogens as "ED*365." What does that mean?

ED is exposure duration, in years, and * is the computer-ese symbol for multiplication. Multiplying ED by 365 simply converts the duration to days. In fact, the ED term is included in both the numerator and denominator of the RBC algorithms for non-cancer risk, canceling it altogether. See RAGS for more information.

6. Why is inorganic lead not included in the RBC Table?

EPA has no consensus RfD or CSF for inorganic lead, so it is not possible to calculate RBCs as we have done for other chemicals. EPA considers lead to be a special case because of the difficulty in identifying the classic "threshold" needed to develop an RfD.

EPA therefore evaluates lead exposure by using blood-lead modeling, such as the Integrated Exposure-Uptake Biokinetic Model (IEUBK). The EPA Office of Solid Waste has also released a detailed directive on risk assessment and cleanup of residential soil lead. The directive recommends that soil lead levels less than 400 mg/kg are generally safe for residential use. Above that level, the document suggests collecting data and modeling blood-lead levels with the IEUBK model. For the purposes of screening, therefore, 400 mg/kg is recommended for residential soils. For water, we suggest 15 ug/l (the EPA Action Level in water), and for air, the National Ambient Air Quality Standard.

7. Where did the CSFs for carcinogenic PAHs come from?

The PAH CSFs are all calculated relative to benzo[a]pyrene, which has an IRIS slope factor. The relative factors for the other PAHs can be found in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," Final Draft, ECAO-CIN-842 (March, 1993).

8. May I please have a copy of a previous RBC Table?

We do not distribute outdated copies of the RBC Table. Each new version of the Table supersedes all previous versions.

9. Please elaborate on the meaning of the "W" source code in the Table.

The "W" code means that a RfD or CSF is currently not present on either IRIS or HEAST, but that it was once present on either IRIS or HEAST and was removed. Such withdrawal usually indicates that consensus on the number no longer exists among EPA scientists, but not that EPA believes the contaminant to be unimportant.

Withdrawn numbers are shown in the Table because we still need to deal with these contaminants during the long delays before replacement numbers are ready. For the purpose of screening, a "W" value is similar to a provisional value in that neither value has achieved Agency consensus. The "W" code should serve as a clear warning that before making any serious decision involving that contaminant, you will need to develop an interim value based on current scientific understanding.

If you are assessing risks at a site where a major contaminant is coded "W," consider working with your Region EPA risk assessor to develop a current toxicity constant. If the site is being studied under CERCLA, the EPA-NCEA Regional Technical Support group

may be able to assist.

10. Can I get copies of supporting documents for interim toxicity constants which are coded "E" in the RBC Table?

Unfortunately, Region 3 does not have a complete set of supporting documents. The EPA-NCEA Superfund Technical Support Center prepares these interim toxicity constants in response to site-specific requests from Regional risk assessors, and sends the documentation only to the requestor. The RBC Tables contain only the latest interim values that we've either requested or have otherwise received. NCEA maintains the master data base of these chemicals, but will not release documentation of provisional values unless they are recent. Furthermore, since NCEA's Superfund Technical Support Center is mainly for the support of Superfund, it usually cannot develop new criteria unless authorized to do so for a specific Superfund project.

If an "E"-coded contaminant is a chemical of potential concern at your site, we urge you to work with the EPA Regional risk assessor assigned to the project in order to develop or obtain documentation for provisional values. EPA Region 3 furnishes documents only when needed to support Regional risk assessments or recommendations.

Attached is a list of "E"-coded chemicals whose supporting documentation was issued prior to 1996, indicating that toxicity information may need to be updated.

11. Why is there no oral RfD for mercury? How should I handle mercury?

IRIS gives oral RfDs for mercuric chloride and for methylmercury, but not for elemental mercury. Therefore, the RBC Table reflects this primary source. Consult your toxicologist to determine which of the available mercury numbers is suitable for the conditions at your site (e.g., whether mercury is likely to be organic or inorganic.)

Attachments

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST E = EPA-NCEA provisional value O = other							Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at HI of 0.1 < RBC-c Risk-based concentrations				
Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
ACETALDEHYDE	75070			2.57E-003 I	7.7E-003 I			8.1E-001 C			
ACETOCHLOR	34256821	2E-002 I					7.3E+002 N	7.3E+001 N	2.7E+001 N	4.1E+004 N	1.6E+003 N
ACETONE	67641	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N
ACETONITRILE	75058	6.00E-003 I		1.40E-002 A			2.2E+002 N	5.1E+001 N	8.1E+000 N	1.2E+004 N	4.7E+002 N
ACETOPHENONE	98862	1.00E-001 I		5.70E-006 W		y	4.2E-002 N	2.1E-002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N
ACROLEIN	107028	2.00E-002 H		5.70E-006 I		y	4.2E-002 N	2.1E-002 N	2.7E+001 N	4.1E+004 N	1.6E+003 N
ACRYLAMIDE	79061	2.00E-004 I	4.50E+000 I		4.50E+000 I		1.5E-002 C	1.4E-003 C	7.0E-004 C	1.3E+000 C	1.4E-001 C
ACRYLONITRILE	107131	1.00E-003 H	5.40E-001 I	5.70E-004 I	2.40E-001 I		1.2E-001 C	2.6E-002 C	5.8E-003 C	1.1E+001 C	1.2E+000 C
ALACHLOR	15972608	1.00E-002 I	8.00E-002 H				8.4E-001 C	7.8E-002 C	3.9E-002 C	7.2E+001 C	8.0E+000 C
ALAR	1596845	1.50E-001 I					5.5E+003 N	5.5E+002 N	2.0E+002 N	3.1E+005 N	1.2E+004 N
ALDICARB	116063	1.00E-003 I					3.7E+001 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N
ALDICARB SULFONE	1646884	1.00E-003 I					3.7E+001 N	3.7E+000 N	1.4E+000 N	2.0E+003 N	7.8E+001 N
ALDRIN	309002	3.00E-005 I	1.70E+001 I		1.70E+001 I		3.9E-003 C	3.7E-004 C	1.9E-004 C	3.4E-001 C	3.8E-002 C
ALUMINUM	7429905	1.00E+000 E		1.00E-003 E			3.7E+004 N	3.7E+000 N	1.4E+003 N	2.0E+006 N	7.8E+004 N
AMINODINITROTOLUENES		6.00E-005 E					2.2E+000 N	2.2E-001 N	8.1E-002 N	1.2E+002 N	4.7E+000 N
4-AMINOPYRIDINE	504245	2.00E-005 H					7.3E-001 N	7.3E-002 N	2.7E-002 N	4.1E+001 N	1.6E+000 N
AMMONIA	7664417			2.86E-002 I		y	2.1E+002 N	1.0E+002 N			
ANILINE	62533		5.70E-003 I	2.90E-004 I		y	1.9E+000 C I	1.1E+000 N	5.5E-001 C	1.0E+003 C	1.1E+002 C
ANTIMONY	7440360	4.00E-004 I					1.5E+001 N	1.5E+000 N	5.4E-001 N	8.2E+002 N	3.1E+001 N
ANTIMONY PENTOXIDE	1314609	5.00E-004 H					1.8E+001 N	1.8E+000 N	6.8E-001 N	1.0E+003 N	3.9E+001 N
ANTIMONY TETROXIDE	1332816	4.00E-004 H					1.5E+001 N	1.5E+000 N	5.4E-001 N	8.2E+002 N	3.1E+001 N
ANTIMONY TRIOXIDE	1309644	4.00E-004 H		5.70E-005 I			1.5E+001 N	2.1E-001 N	5.4E-001 N	8.2E+002 N	3.1E+001 N
ARSENIC	7440382	3.00E-004 I	1.50E+000 I		1.51E+001 I		4.5E-002 C	4.1E-004 C	2.1E-003 C	3.8E+000 C	4.3E-001 C
ARSINE	7784421			1.40E-005 I		y	1.0E-001 N	5.1E-002 N			
ASSURE	76578148	9.00E-003 I					3.3E+002 N	3.3E+001 N	1.2E+001 N	1.8E+004 N	7.0E+002 N
ATRAZINE	1912249	3.50E-002 I	2.20E-001 H				3.0E-001 C	2.8E-002 C	1.4E-002 C	2.6E+001 C	2.9E+000 C
AZOBENZENE	103333		1.10E-001 I		1.10E-001 I		6.1E-001 C	5.7E-002 C	2.9E-002 C	5.2E+001 C	5.8E+000 C
BARIUM	7440393	7.00E-002 I		1.40E-004 A			2.6E+003 N	5.1E-001 N	9.5E+001 N	1.4E+005 N	5.5E+003 N
BAYGON	114261	4.00E-003 I					1.5E+002 N	1.5E+001 N	5.4E+000 N	8.2E+003 N	3.1E+002 N
BAYTHROID	68359375	2.50E-002 I					9.1E+002 N	9.1E+001 N	3.4E+001 N	5.1E+004 N	2.0E+003 N
BENTAZON	25057890	3.00E-002 I					1.1E+003 N	1.1E+002 N	4.1E+001 N	6.1E+004 N	2.3E+003 N
BENZALDEHYDE	100527	1.00E-001 I					3.7E+003 N	3.7E+002 N	1.4E+002 N	2.0E+005 N	7.8E+003 N
BENZENE	71432	3.00E-003 E	2.90E-002 I	1.70E-003 E	2.90E-002 I	y	3.6E-001 C	2.2E-001 C	1.1E-001 C	2.0E+002 C	2.2E+001 C
BENZENETHIOL	108985	1.00E-005 H				y	6.1E-002 N	3.7E-002 N	1.4E-002 N	2.0E+001 N	7.8E-001 N
BENZIDINE	92875	3.00E-003 I	2.30E+002 I		2.30E+002 I		2.9E-004 C	2.7E-005 C	1.4E-005 C	2.5E-002 C	2.8E-003 C
BENZOIC ACID	65850	4.00E+000 I					1.5E+005 N	1.5E+004 N	5.4E+003 N	8.2E+006 N	3.1E+005 N
BENZYL ALCOHOL	100516	3.00E-001 H					1.1E+004 N	1.1E+003 N	4.1E+002 N	6.1E+005 N	2.3E+004 N
BENZYL CHLORIDE	100447		0.17 I			y	6.2E-002 C	3.7E-002 C	1.9E-002 C	3.4E+001 C	3.8E+000 C
BERYLLIUM	7440417	2.00E-003 I		5.7E-006 I	8.40E+000 I		7.3E+001 N	7.5E-004 C	2.7E+000 N	4.1E+003 N	1.6E+002 N
BIPHENYL	92524	5.00E-002 I				y	3.0E+002 N	1.8E+002 N	6.8E+001 N	1.0E+005 N	3.9E+003 N
BIS(2-CHLOROETHYL)ETHER	111444		1.10E+000 I		1.10E+000 I		6.1E-002 C	5.7E-003 C	2.9E-003 C	5.2E+000 C	5.8E-001 C
BIS(2-CHLOROISOPROPYL)ETHER	108601	4.00E-002 I	7.00E-002 H		3.50E-002 H	y	2.6E-001 C	1.8E-001 C	4.5E-002 C	8.2E+001 C	9.1E+000 C
**BIS(CHLOROMETHYL)ETHER	542881		2.20E+002 I		2.20E+002, I	y	4.8E-005 C	2.8E-005 C	1.4E-005 C	2.6E-002 C	2.9E-003 C
**BIS(2-ETHYLHEXYL)PHTHALATE	117817	2.00E-002 I	1.40E-002 I		1.40E-002 E		4.8E+000 C	4.5E-001 C	2.3E-001 C	4.1E+002 C	4.6E+001 C
**BORON	7440428	9.00E-002 I		5.70E-003 H			3.3E+003 N	2.1E+001 N	1.2E+002 N	1.8E+005 N	7.0E+003 N

MRLs (ATSDR)

MRLs

Agency for Toxic Substances and Disease Registry

Division of Toxicology

ATSDR Contact Person for MRLs

Minimal Risk Levels (MRLs) for Hazardous Substances

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) [42 U.S.C. 9604 et seq.], as amended by the Superfund Amendments and Reauthorization Act (SARA) [Pub. L. 99-499], requires that the Agency for Toxic Substances and Disease Registry (ATSDR) develop jointly with the U.S. Environmental Protection Agency (EPA), in order of priority, a list of hazardous substances most commonly found at facilities on the CERCLA National Priorities List (NPL) (42 U.S.C. 9604(i)(2)); prepare toxicological profiles for each substance included on the priority list of hazardous substances, and to ascertain significant human exposure levels (SHELs) for hazardous substances in the environment, and the associated acute, subacute, and chronic health effects (42 U.S.C. 9604(i)(3)); and assure the initiation of a research program to fill identified data needs associated with the substances (42 U.S.C. 9604(i)(5)).

The ATSDR Minimal Risk Levels (MRLs) were developed as an initial response to the mandate. Following discussions with scientists within the Department of Health and Human Services (HHS) and the EPA, ATSDR chose to adopt a practice similar to that of the EPA's Reference Dose (RfD) and Reference Concentration (RfC) for deriving substance-specific health guidance levels for non-neoplastic endpoints. An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse noncancer health effects over a specified duration of exposure. These substance-specific estimates, which are intended to serve as screening levels, are used by ATSDR health assessors and other responders to identify contaminants and potential health effects that may be of concern at hazardous waste sites. **It is important to note that MRLs are not intended to define clean-up or action levels for ATSDR or other Agencies.**

The toxicological profiles include an examination, summary, and interpretation of available toxicological information and epidemiologic evaluations of a hazardous substance. During the development of toxicological profiles, MRLs are derived when ATSDR determines that reliable and sufficient data exist to identify the target organ(s) of effect or the most sensitive health effect(s) for a specific duration for a given route of exposure to the substance. MRLs are based on noncancer health effects only and are not based on a consideration of cancer effects. Inhalation MRLs are exposure concentrations expressed in units of parts per million (ppm) for gases and volatiles, or milligrams per cubic meter (mg/m3) for particles. Oral MRLs are expressed as daily human doses in units of milligrams per kilogram per day (mg/kg/day).

ATSDR uses the no-observed-adverse-effect-level/uncertainty factor approach to derive MRLs for hazardous substances. They are set below levels that, based on current information, might cause adverse health effects in the people most sensitive to such substance-induced effects. MRLs are derived for acute (1-14 days), intermediate (15-364 days), and chronic (365 days and longer) exposure durations, and for the oral and inhalation routes of exposure. Currently, MRLs for the dermal route of exposure are not derived because ATSDR has not yet identified a method suitable for this route of exposure. MRLs are generally based on the most sensitive substance-induced end point considered to be of relevance to humans. ATSDR does not use serious health effects (such as irreparable damage to the liver or kidneys, or birth defects) as a basis for establishing MRLs. Exposure to a level above the MRL does not mean that adverse health effects will occur.

MRLs are intended to serve as a screening tool to help public health professionals decide where to look more closely. They may also be viewed as a mechanism to identify those hazardous waste sites that are not expected to cause adverse health effects. Most MRLs contain some degree of uncertainty because of the lack of precise toxicological information on the people who might be most sensitive (e.g., infants, elderly, and nutritionally or immunologically compromised) to the effects of hazardous substances. ATSDR uses a conservative (i.e., protective) approach to address these uncertainties consistent with the public health principle of prevention. Although human data are preferred, MRLs often must be based on animal studies because relevant human studies are lacking. In the absence of evidence to the contrary, ATSDR assumes that humans are more sensitive than animals to the effects of hazardous substances and that certain persons may be particularly sensitive. Thus, the resulting MRL may be as much as a hundredfold below levels shown to be nontoxic in laboratory animals.

Proposed MRLs undergo a rigorous review process. They are reviewed by the Health Effects/MRL Workgroup within the Division of Toxicology; an expert panel of external peer reviewers; the agency wide MRL Workgroup, with participation from other federal agencies, including EPA; and are submitted for public comment through the toxicological profile public comment period. Each MRL is subject to change as new information becomes available concomitant with updating the toxicological profile of the substance. MRLs in the most recent toxicological profiles supersede previously published levels. A listing of the current published MRLs is provided as follows.

ATSDR Contact Person

For additional information regarding MRLs, please contact:

Dr. Selene Chou
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Agency for Toxic Substances and Disease Registry
1600 Clifton Road, Mailstop E29
Atlanta, Georgia 30333
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FAX (404)639-6315
E-Mail: cjc3@cdc.gov

Note: Information is in landscape format. Please use scroll bar on the bottom of the screen to access all the information. You can also search the index of substances quickly by using the "Find" button.

ATSDR MINIMAL RISK LEVELS (MRLs)

April 1999

Name	Route	Duration	MRL	Factors	Endpoint	Draft/ Final	Cover Date	CAS Nu
ACENAPHTHENE	Oral	Int.	0.6 mg/kg/day	300	Hepatic	Final	08/95	000083
ACETONE	Inh.	Acute	26 ppm	9	Neurol.	Final	05/94	000067
		Int.	13 ppm	100	Neurol.			
		Chr.	13 ppm	100	Neurol.			
	Oral	Int.	2 mg/kg/day	100	Hemato.			
ACROLEIN	Inh.	Acute	0.00005 ppm	100	Ocular	Final	12/90	000107
		Int.	0.000009 ppm	1000	Resp.			
	Oral	Chr.	0.0005 mg/kg/day	100	Hemato.			
ACRYLONITRILE	Inh.	Acute	0.1 ppm	10	Neurol.	Final	12/90	000107
	Oral	Acute	0.1 mg/kg/day	100	Develop.			
		Int.	0.01 mg/kg/day	1000	Repro.			
		Chr.	0.04 mg/kg/day	100	Hemato.			
ALDRIN	Oral	Acute	0.002 mg/kg/day	1000	Develop.	Final	04/93	000309
		Chr.	0.00003 mg/kg/day	1000	Hepatic			
AMMONIA	Inh.	Acute	0.5 ppm	100	Resp.	Final	12/90	007664
		Chr.	0.3 ppm	10	Resp.			
	Oral	Int.	0.3 mg/kg/day	100	Other			
ANTHRACENE	Oral	Int.	10 mg/kg/day	100	Hepatic	Final	08/95	000120
AROCLOR 1254	Oral	Chr.	0.02 ug/kg/d	300	Immuno.	Draft	12/98	011097
ARSENIC	Oral	Chr.	0.0003 mg/kg/day	3	Dermal	Draft	10/98	007440
BENZENE	Inh.	Acute	0.05 ppm	300	Immuno.	Final	09/97	000071
		Int.	0.004 ppm	90	Neurol.			
BIS(CHLOROMETHYL) ETHER	Inh.	Int.	0.0003 ppm	100	Resp.	Final	12/89	000542

IRIS

EPA United States Environmental Protection Agency

IRIS

Integrated Risk Information System

What's New | Substance File List

Welcome to the IRIS home page, brought to you by the U.S. Environmental Protection Agency (EPA) and its Office of Research and Development, National Center for Environmental Assessment. IRIS is a database of human health effects that may result from exposure to various substances found in the environment. **Click on the Substance File List button to go to a list of the available substance files; then click on any file name on the list to open that file.** For more information about IRIS, read this **Introduction**.

Click here for What's New on IRIS, which highlights the most recent changes to IRIS files.

See the Glossary of Risk Assessment-Related Terms and the list of Acronyms and Abbreviations for more information explaining terms used in IRIS files.

A list of Toxicological Review support documents are available online. They are provided in the Adobe Acrobat Portable Document Format* (PDF).

Background Information on methods used by EPA for deriving values in IRIS is available here. Information on Limitations to the Use of IRIS is here. For information on downloading IRIS, see the Stand Alone (Downloadable) IRIS Database page.

Here are some links to other sources of environmental health information.

EPA is continuously seeking to improve the IRIS home page and the scientific content of IRIS. We welcome your comments and suggestions for improvements. Send comments to the IRIS webmaster by email to Iris.Webmaster@epa.gov

For technical questions about the scientific information content in IRIS, please call the U.S. EPA Risk Information Hotline at telephone 1-513-569-7254, or fax to 1-513-569-7159, or email to RIH.IRIS@epamail.epa.gov.

Navigation hints:
From the opening list of substances, you can click on individual substance names, or the list can be searched with your web browser, such as Netscape or Internet Explorer, by typing the name or Chemical Abstracts Service (CAS) Registry Number at the "**Find**"

HEAST

Environmental Protection Agency

Emergency Response

EPA-540-R-97-036
PB97-921199
July 1997

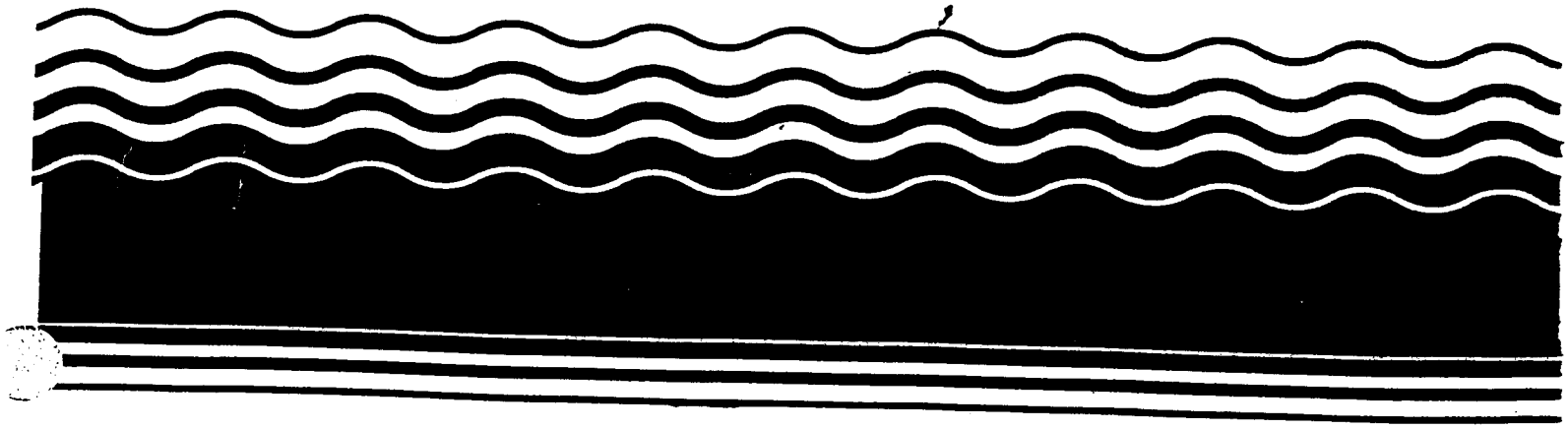
Superfund

EPA

Health Effects Assessment Summary Tables

PB97-921199

FY 1997 Update



APPENDIX E

Document for Generic Turner Method for Estimated Exposure from Near-Ground Releases to Air

ESTIMATING AMBIENT INHALATION EXPOSURES
DUE TO NEAR-GROUND RELEASES OF PMN CHEMICALS

Turner's (1970) sector averaging form of the Gaussian algorithm can be used to estimate concentrations resulting from a point source release:

$$C = \left[\frac{(2.03)(Q)}{(X)(\delta z)(u)} \right] e^{-[(-0.5)(H/\delta z)^2]}$$

Where:

C	=	Concentration in ambient air (mg/m^3)
Q	=	Release rate (mg/sec)
H	=	Release height (m)
X	=	Receptor distance from source (m)
δz	=	Vertical dispersion coefficient (m)
u	=	Mean wind speed (m/sec)

Using the following assumptions, Equation No. 1 can be reduced to Equation No. 2:

$$Conc. = (Q)\ (6.165\ x\ 10^{-4})$$

H	=	3m
X	=	100m
δz	=	5m (assumes neutral atmospheric stability)
U^2	=	5.5 m/sec

$$Conc. = (Q)\ (6.165\ x\ 10^{-4})$$

Since Equation No. 1 and Equation No. 2 use units of mg/sec for Q and air releases may be reported in units of kg/yr, a conversion factor must be included in Equation No. 2. Assuming a continuous release, kg/yr can be converted to mg/sec by multiplying by 0.0317 (mg/sec)/(kg/yr). Thus, the revised Equation No. 2 is listed below as Equation No. 3.

It is unlikely that any long-term releases would be blown continuously in the same direction. It would be more reasonable to assume that, as a reasonable worst case, the wind blows in one direction 25 percent of the time. Thus, the corrected Equation No. 3 is listed below as Equation No. 4.

$$Conc. = (Q_{yr})(4.88 \times 10^{-6})$$

Annual exposure can be estimated using Equation No. 5.

$$EXPOSURE = (C)\ (IR)\ (D)\ (F)$$

Where:

C = Result from Equation No. 4
IR = Assumed to be 1 m^3/hr
D = 24 hrs/day
F = 365 days/yr

Using the above parameters in Equation No. 5, annual exposure can readily be estimated using Equation No. 6.

$$Annual\ Exposure = mg/yr = (Q_{yr}\ (0.043)$$

Note that because the exposure estimate is an annual average, it does not matter whether the release occurs on a long-term or short-term basis. The average annual exposure is the same for both situations assuming the annual amount released is the same.

APPENDIX F

Examples of Release, Site and Monitoring Data Collected by Committee

- **Registered Source Emissions from MDE**
- **TAP Emission Data from MDE**
- **MDE Ambient Air Monitoring Station Description and Data**
- **Data Retrieved from TRI**
- **Data Retrieved from FINDS**
- **Dun and Bradstreet Facility Data**
- **MDE Facility Data**

Registered Source Emissions Data from MDE

Registered Source Emissions - Zip Codes 21225 and 21226

No.	Premise Name and Address	Air Pollutant	Annual Emissions	Data Source
1	7-11 Station	Volatile Organic Chemicals	6,200 lbs	1995 Emissions Statement
	400 Ritchie Highway	Toxic Air Pollutants	NR	No Report
2	7-11 Station	Volatile Organic Chemicals	2,920 lbs	1995 Emissions Statement
	5617 Ritchie Highway & Church Street	Toxic Air Pollutants	NR	No Report
3	A-A Recycle & Sand	Particulate Matter	1,560 lbs	1995 Emissions Statement
	6931 Baltimore Annapolis Boulevard	Sulfur Oxides	320 lbs	1995 Emissions Statement
		Toxic Air Pollutants	NR	No Report
4	Amerada Hess Terminal	Particulate Matter	4,460 lbs	1995 Emissions Statement
	6299 Pennington Avenue	Sulfur Oxides	51,980 lbs	1995 Emissions Statement
		Nitrogen Oxides	18,320 lbs	1995 Emissions Statement
		Carbon Monoxide	1,660 lbs	1995 Emissions Statement
		Volatile Organic Chemicals	172,280 lbs	1995 Emissions Statement
		Toxic Air Pollutants	NR	No Report
5	Amoco Station	Volatile Organic Chemicals	23,000 lbs	1995 Emissions Statement
	101 West Patapsco Avenue	Toxic Air Pollutants	NR	No Report
6	Amoco Station	Volatile Organic Chemicals	22,560 lbs	1995 Emissions Statement
	5500 Ritchie Highway	Toxic Air Pollutants	NR	No Report
7	Amoco Asphalt Terminal	Particulate Matter	360 lbs	1995 Emissions Statement
	3901 Asiatic Avenue	Sulfur Oxides	10,940 lbs	1995 Emissions Statement
		Nitrogen Oxides	5,100 lbs	1995 Emissions Statement
		Carbon Monoxide	1,460 lbs	1995 Emissions Statement
		Volatile Organic Chemicals	2,420 lbs	1995 Emissions Statement
		Toxic Air Pollutants	NR	No Report
8	Amoco Terminal	Particulate Matter	2,400 lbs	1995 Emissions Statement
	6101 Pennington Avenue	Sulfur Oxides	27,600 lbs	1995 Emissions Statement
		Nitrogen Oxides	9,600 lbs	1995 Emissions Statement
		Carbon Monoxide	1,200 lbs	1995 Emissions Statement
		Volatile Organic Chemicals	1,000 lbs	1995 Emissions Statement
		Toxic Air Pollutants	NR	No Report
9	Amoco Terminal	Volatile Organic Chemicals	85,040 lbs	1995 Emissions Statement
	801 East Ordnance Road	Toxic Air Pollutants	NR	No Report
10	Ansam Metals Corp.	Particulate Matter	560 lbs	1995 Emissions Statement
	1026 East Patapsco Avenue	Sulfur Oxides	580 lbs	1995 Emissions Statement
		Nitrogen Oxides	400 lbs	1995 Emissions Statement
		Carbon Monoxide	2,880 lbs	1995 Emissions Statement
		Volatile Organic Chemicals	780 lbs	1995 Emissions Statement
		Toxic Air Pollutants	NR	No Report
11	Arundel Corp.	Particulate Matter	40,120 lbs	1995 Emissions Statement
	4th & Frankfurst Avenue	Sulfur Oxides	1,500 lbs	1995 Emissions Statement
		Nitrogen Oxides	740 lbs	1995 Emissions Statement
		Carbon Monoxide	240 lbs	1995 Emissions Statement
		Toxic Air Pollutants	NR	No Report
12	Arundel Elementary School	Particulate Matter	360 lbs	1995 Emissions Statement
	2400 Round Way	Sulfur Oxides	1,080 lbs	1995 Emissions Statement
		Nitrogen Oxides	1,080 lbs	1995 Emissions Statement
		Carbon Monoxide	360 lbs	1995 Emissions Statement
		Toxic Air Pollutants	NR	No Report
13	Atotech USA	Particulate Matter	3,980 lbs	1995 Emissions Statement
	1900 Chesapeake Avenue	Nitrogen Oxides	17,780 lbs	1995 Emissions Statement
		Carbon Monoxide	240 lbs	1995 Emissions Statement
		Antimony Compounds	2,673 lbs	1994 EPA Form R
		Chromium Compounds	1 lb	1994 EPA Form R
		Nitric Acid	1 lb	1994 EPA Form R
		Zinc Compounds	1 lb	1994 EPA Form R
14	Autobahn Motors	Volatile Organic Chemicals	2,520 lbs	1995 Emissions Statement
	3704 South Hanover Street	Toxic Air Pollutants	NR	No Report
15	Automated Plating	Nitrogen Oxides	360 lbs	1995 Emissions Statement
	1927 Benhill Avenue	Toxic Air Pollutants	NR	No Report
16	Baltimore City Composting Facility	Volatile Organic Chemicals	360 lbs	1995 Emissions Statement
	5800 Quarantine Road	Toxic Air Pollutants	NR	No Report
17	Baltimore Scrap	Particulate Matter	1,820 lbs	1995 Emissions Statement
	1600 Carbon Avenue	Toxic Air Pollutants	NR	No Report

TAP Emissions Data from MDE

TAP Emissions in Zip Codes 21225 & 21226

Premise Number	Plant name	Street Address	Zip Code	Pollutant	CAS #	Emissions lbs/hr	Emissions tons/year
02-0023	VALLEY PROTEINS	1515 OPEN STREET CURTIS BAY	21226	Chlorine dioxide (AAL-15,5) Stack	10049044	0.0833	0.2520
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Ethyl benzene	100414	0.2500	0.0174
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Ethylene glycol	107211	0.0070	0.0056
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Methyl isobutyl ketone	108101	1.0200	0.1055
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Maleic anhydride	108316	0.0020	0.0006
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Toluene	108883	0.6700	0.0804
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	2-Butoxyethanol	111762	0.0590	0.0126
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Ethanol,2-(2-butoxyethoxy) (X)	112345	0.3900	0.0448
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Xylene	1330207	1.8000	0.2665
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Isophorone diisocyanate	4098719	0.0000	0.0000
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Toluene 2,4-diisocyanate	584849	0.0020	0.0004
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Isopropyl alcohol	67630	0.7500	0.0500
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	n-Butyl alcohol	71363	0.2700	0.0625
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	sec-Butyl alcohol	78922	0.2200	0.0156
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Methyl ethyl ketone	78933	0.0160	0.0355
02-0044	REICHHOLD CHEMICAL	6401 CHEMICAL ROAD BALTIMORE	21226	Toluene, 2,6-diisocyanate	91087	0.0011	0.0002
02-0055	SOUTHERN STATES CORP.	ORDINANCE ROAD & PENNINGTON	21226	Manganese & compounds (Fumes)	7439965	0.0007	0.0002
02-0055	SOUTHERN STATES CORP.	ORDINANCE ROAD & PENNINGTON	21226	Copper & compounds	7440508	0.0007	0.0002
02-0055	SOUTHERN STATES CORP.	ORDINANCE ROAD & PENNINGTON	21226	Phosphoric acid	7664382	0.0000	0.0000
02-0056	CHEMETALS CORPORATION	711 PITTMAN ROAD, CURTIS BAY	21226	Manganese & compounds (Fumes)	7439965	5.0057	21.9250
02-0056	CHEMETALS CORPORATION	711 PITTMAN ROAD, CURTIS BAY	21226	Hydrogen chloride (AAL-117)	7647010	1.5600	6.8330
02-0056	CHEMETALS CORPORATION	711 PITTMAN ROAD, CURTIS BAY	21226	Ammonia (AAL-450,300) Eliminated change of oper	7664417	6.8000	29.7840
02-0056	CHEMETALS CORPORATION	711 PITTMAN ROAD, CURTIS BAY	21226	Sulfuric acid Stack	7664939	0.4130	1.8105
02-0056	CHEMETALS CORPORATION	711 PITTMAN ROAD, CURTIS BAY	21226	Hydrogen peroxide	7722841	0.3000	1.3140
02-0056	CHEMETALS CORPORATION	711 PITTMAN ROAD, CURTIS BAY	21226	Hydrogen sulfide Stack	7783064	0.0016	0.0070
02-0309	AMOCO OIL COMPANY	16 ORDINANCE ROAD CURTIS BAY	21226	Ethyl benzene	100414	0.0790	0.3470
02-0309	AMOCO OIL COMPANY	16 ORDINANCE ROAD CURTIS BAY	21226	Toluene	108883	1.1100	4.8730
02-0309	AMOCO OIL COMPANY	16 ORDINANCE ROAD CURTIS BAY	21226	Phenol	108952	0.0000	0.0000
02-0309	AMOCO OIL COMPANY	16 ORDINANCE ROAD CURTIS BAY	21226	Xylene	1330207	0.3000	1.3000
02-0309	AMOCO OIL COMPANY	16 ORDINANCE ROAD CURTIS BAY	21226	Methyl-tertiary-butyl-ether(X)	1634044	2.3400	10.2000
02-0309	AMOCO OIL COMPANY	16 ORDINANCE ROAD CURTIS BAY	21226	Benzene	71432	0.4620	2.0200
02-0316	US COAST GUARD	CONCRETE ROAD	21226	Methylene bis(phenylisocyanate)	101688	0.0000	0.0000
02-0316	US COAST GUARD	CONCRETE ROAD	21226	Ethylene glycol	107211	0.1600	0.1700
02-0316	US COAST GUARD	CONCRETE ROAD	21226	Methyl isobutyl ketone	108101	0.4000	0.2835
02-0316	US COAST GUARD	CONCRETE ROAD	21226	Toluene	108883	0.4000	0.3870
02-0316	US COAST GUARD	CONCRETE ROAD	21226	2-Butoxyethanol	111762	0.0560	0.0585
02-0316	US COAST GUARD	CONCRETE ROAD	21226	Perchloroethylene	127184	0.0200	0.0185
02-0316	US COAST GUARD	CONCRETE ROAD	21226	Sodium hydroxide	1310732	0.0020	0.0025
02-0316	US COAST GUARD	CONCRETE ROAD	21226	Manganese Oxide	1313139	0.0020	0.0120
02-0316	US COAST GUARD	CONCRETE ROAD	21226	Xylene	1330207	0.0600	0.0575
02-0316	US COAST GUARD	CONCRETE ROAD	21226	Carbonic Acid Disodium Salt	497198	0.0012	0.0050

Fugitive

Fugitive

MDE Ambient Air Monitoring Station Description and Data

6/24/97

MARYLAND DEPARTMENT OF THE ENVIRONMENT
AIR AND RADIATION MANAGEMENT ADMINISTRATION
TOXICS MONITORING IN MARYLAND

EPA Method TO-14 Toxics Monitoring Network

We are collecting 24 hour canister samples every sixth day on the EPA schedule at these sites:

1. Essex
2. North East Police Station (NEPS)
3. Old Town Fire Department
4. Ft. McHenry
5. FMC
6. Glenn Burnie

also (samples collected by the local or State agency, analyzed by ARMA)

7. Flag Plaza, Pittsburgh
8. AMSL, Philadelphia
9. Lums Pond, DE.
10. Washington, DC.
11. Chester, PA.
12. Marcus Hook, PA.
13. Chester, WVA.
14. Three sites in Ohio (on a variable schedule).

We have been designated as the Quality Assurance laboratory for EPA Region III and split QA samples with Virginia and EPA Regions I and II.

Samples are collected using either an EPA designed and fabricated sampler or the XonTech Model 810A Ambient Air Collection Sampler. Samples are collected into evacuated (less than 1 mm Hg absolute pressure) 6 liter SUMMA treated stainless steel sampling canisters and filled to a pressure of about 2 atmospheres over the day (midnight to midnight). At midnight of the sampling day the sampler starts a pump which pulls ambient air through a stainless steel sampling cane and pushes the air through a mass flow controller, a shut off valve and into the canister. The flow rate of 8.3 millimeters per minute is maintained throughout the 24 hours.

At the end of the 24 hour period the shut off valve is closed to trap the sample in the canister and the sampler turns off. Between the sampling dates ARMA personnel visit the site, close the manual valve on the canister, remove the canister from the sampler and place a new canister on the sampler for the next sampling date.

The canisters are returned to the laboratory for analysis using an EnTech Model 2000 Preconcentrator and a Hewlett-Packard Model 5890 gas chromatograph with a Model 5971 mass selective detector (GC/MSD). We are following EPA COMPENDIUM METHOD TO-14, "The Determination of Volatile Organic Compounds (VOCs) in Ambient Air Using SUMMA Passivated Canister Sampling and Gas Chromatographic Analysis".

FORTY ONE COMPOUNDS DETERMINED BY GC/MSD USING EPA METHOD TO-14

Benzene
Bromomethane
1,3-Butadiene
Carbon Tetrachloride
Chlorobenzene
Chloroethane
Chloroethene
Chloroform
Chloromethane
Chloromethylbenzene
1,2-Dibromoethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
1,2-Dichloro-1,1,2,2-tetrafluoroethane
Ethylbenzene
1-Ethyl-4-methyl benzene
Hexachloro-1,3-butadiene
Methylene chloride
Styrene
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
1,1,2-Trichloro-1,2,2-trifluoroethane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
o-Xylene
m & p-Xylene

GENERAL AIR QUALITY

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: (1) sulfur dioxide, (2) particulate matter, (3) carbon monoxide, (4) nitrogen dioxide, (5) ozone, and (6) lead. The primary standards were established to protect public health, and the secondary standards were developed to protect against non-health effects such as damage to property and vegetation.

The Department operates an air monitoring network throughout the State in accordance with EPA guidelines to measure the concentrations of the criteria pollutants in the ambient air. These measurements have been used to project statewide ambient air quality and have indicated that south Baltimore meets the ambient air quality standards for sulfur dioxide, particulate matter, carbon monoxide, nitrogen dioxide, and lead.

Ground level ozone continues to present a problem for the Baltimore/Washington area, which is classified as a non-attainment area for ozone. The primary contributors to the formation of ozone are emissions of oxides of nitrogen, primarily from combustion equipment, and emissions of Volatile Organic Compounds (VOC) such as paint solvents and gasoline vapors.

A brief description of this complicated method is as follows:

The sample canisters, along with a canister of zero air, a QA mixture and a canister of standard gas, are placed on a sixteen position sampling manifold. Pollutants in the air (zero air, standard, QA mix or sample) are concentrated using an EnTech Model 2000 Preconcentrator. A glass bead trap is cooled to -150 C and then 500 ml of sample is pulled through the trap. The organic compounds in the air freeze out on the glass beads while the normal air constituents (including methane) pass through the trap. A second smaller trap is then cooled to -160 C. The first trap is heated to 180 C and the collected compounds are driven off of the trap onto the second focusing trap using a smaller volume of gas (7 ml). After the compounds are transferred to the focusing trap, this trap is heated to 75 C and the compounds are driven off of the trap into the GC.

The compounds pass through the GC and are separated so that the most volatile pass through first. The compounds then pass from the GC to the MSD where they are detected. Two analysis of zero air are made first to show that the analytical system is clean. Then the system is calibrated using three levels of a 41 compound known standard mixture. These compounds are specified in the TO-14 Method and are listed on the attached table. Then a QA mixture containing four compounds of known amounts prepared by a different method are analyzed to double check the system. After the system is shown to be clean, is calibrated and passes the QA check, the samples are analyzed in the sample manner as the standards. Results are obtained by comparing the signal amounts from the samples to the known signals from the standard mixture. This is done using the HP software that is used with the GC/MSD and reports are obtained for each sample with the 41 compounds listed in parts per billion.

TWENTY FOUR HOUR TOXICS AIR SAMPLING
PARTS PER BILLION V/V, 1992

(41) COMPOUNDS	OLD TOWN			F.M.C. CORP.			FORT McHENRY		
	MIN.	MAX.	AVG.	MIN.	MAX.	AVG.	MIN.	MAX.	AVG.
Dichlorodifluoromethane	0.00	1.47	0.71	0.29	1.30	0.64	0.19	1.28	0.68
Chloromethane (Methyl chloride)	0.14	1.35	0.59	0.26	2.11	0.78	0.16	1.23	0.62
1,2–dichloro–1,1,2,2–tetrafluoroethane	0.00	0.03	0.01	0.00	0.03	0.01	0.00	0.03	0.02
Chloroethene (Vinyl chloride)	0.00	0.17	0.01	0.00	0.15	0.01	0.00	0.17	0.01
1,3–Butadiene	0.00	0.51	0.26	0.00	0.37	0.10	0.00	0.21	0.09
Bromomethane (Methyl bromide)	0.00	0.14	0.02	0.00	0.63	0.05	0.00	0.14	0.03
Chloroethane (Ethyl chloride)	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
Trichlorofluoromethane	3.33	39.34	9.95	0.22	4.28	0.55	0.29	1.06	0.45
1,1–Dichloroethene	0.00	0.13	0.02	0.00	0.09	0.02	0.00	0.14	0.03
Methylene chloride (Dichloromethane)	0.12	6.75	0.50	0.08	5.59	0.40	0.09	3.16	0.30
1,1,2–trichloro–1,2,2–trifluoroethane	0.43	3.89	1.16	0.16	2.59	0.39	0.07	0.26	0.13
1,1–Dichloroethane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
cis 1,2–Dichloroethene	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.04	0.00
Chloroform (Trichloromethane)	0.00	0.16	0.06	0.00	0.16	0.04	0.00	0.11	0.05
1,2–Dichloroethane (EDC)	0.00	0.07	0.01	0.00	0.09	0.01	0.00	0.07	0.01
1,1,1–trichloroethane	0.15	2.66	0.51	0.17	0.74	0.37	0.22	1.05	0.39
Benzene	0.54	2.71	1.09	0.20	6.03	1.32	0.20	1.29	0.53
Carbon tetrachloride	0.04	0.24	0.12	0.05	1.71	0.20	0.03	0.20	0.12
1,2–Dichloropropane	0.00	0.02	0.00	0.00	0.11	0.00	0.00	0.01	0.00
Trichloroethene (Trichloroethylene)	0.00	0.29	0.03	0.00	0.17	0.02	0.00	0.13	0.03
cis–1,3–dichloropropene	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
trans–1,3–dichloropropene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
1,1,2–Trichloroethane	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Toluene	0.83	6.91	2.35	0.30	9.74	2.00	0.28	2.89	1.10
1,2–Dibromoethane (Ethylene dibromide)	0.00	0.07	0.00	0.00	0.07	0.01	0.00	0.07	0.01
Tetrachloroethene (Perchloroethylene)	0.05	0.56	0.16	0.00	0.20	0.10	0.00	0.21	0.09
Chlorobenzene	0.00	0.03	0.00	0.00	0.11	0.04	0.00	0.08	0.01
Ethylbenzene	0.14	1.09	0.38	0.05	1.00	0.27	0.06	0.50	0.18
meta & para–Xylene	0.49	3.24	1.26	0.16	4.05	0.97	0.17	1.46	0.60
Styrene	0.02	0.32	0.10	0.00	0.22	0.07	0.00	0.45	0.05
1,1,2,2–Tetrachloroethane	0.00	0.02	0.00	0.00	0.03	0.00	0.00	0.02	0.00
ortho–Xylene	0.18	1.18	0.52	0.08	1.14	0.35	0.09	1.81	0.36
1–Ethyl–4–methyl benzene	0.00	0.64	0.24	0.02	0.44	0.09	0.02	0.15	0.05
1,3,5–Trimethylbenzene	0.08	0.78	0.30	0.00	0.23	0.09	0.02	0.14	0.06
1,2,4–Trimethylbenzene (Pseudocumene)	0.22	2.68	0.93	0.05	0.76	0.26	0.06	0.44	0.17
1,3–Dichlorobenzene	0.00	0.15	0.01	0.00	0.03	0.01	0.00	0.05	0.01
Chloromethylbenzene	0.00	0.00	0.00	0.00	1.33	0.03	0.00	0.00	0.00
1,4–Dichlorobenzene(p–Dichlorobenzene)	0.00	0.17	0.05	0.00	0.09	0.03	0.00	0.12	0.03
1,2–Dichlorobenzene(o–Dichlorobenzene)	0.00	0.04	0.00	0.00	0.05	0.01	0.00	0.03	0.00
1,2,4–Trichlorobenzene	0.00	0.02	0.00	0.00	0.10	0.01	0.00	0.01	0.00
Hexachloro–1,3–butadiene	0.00	0.01	0.00	0.00	0.05	0.00	0.00	0.00	0.00

Data Retrieved from TRI

OBS	Facility Name	Address	TRI Facility ID	State County FIPS	ZIP	Preferre Latitude	Preferred Longitud	Standard Industry Code	Chemical Name	Y if Carcinoge	Total Air Emission	Fugitive Air Emission	Stack Air Emission	Reportin Year
302	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHANOL	N	1500	750	750	1987
303	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	DICHLOROMETHANE	Y	7000	4000	3000	1987
304	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHYL ISOBUTYL KETONE	N	500	250	250	1987
305	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	HYDROCHLORIC ACID	N	500	250	250	1987
306	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHANOL	N	808	740	68	1988
307	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	ACETONITRILE	Y	9	6	3	1988
308	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	DICHLOROMETHANE	Y	5200	2700	2500	1988
309	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHYL ISOBUTYL KETONE	N	21	4	17	1988
310	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	HYDROCHLORIC ACID	N	3	1	2	1988
311	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHANOL	N	500	250	250	1989
312	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	ACETONITRILE	Y	500	250	250	1989
313	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	DICHLOROMETHANE	Y	2900	1500	1400	1989
314	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHYL ISOBUTYL KETONE	N	500	250	250	1989
315	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	HYDROCHLORIC ACID	N	500	250	250	1989
316	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	AMMONIA	N	500	250	250	1989
317	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	SULFURIC ACID	N	0	0	0	1989
318	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHANOL	N	500	250	250	1990
319	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	ACETONITRILE	Y	500	250	250	1990
320	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	DICHLOROMETHANE	Y	2900	1500	1400	1990
321	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHYL ISOBUTYL KETONE	N	500	250	250	1990
322	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	HYDROCHLORIC ACID	N	500	250	250	1990
323	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	AMMONIA	N	500	250	250	1990
324	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	SULFURIC ACID	N	10	5	5	1990
325	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHANOL	N	35	20	15	1991
326	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	ACETONITRILE	Y	210	10	200	1991
327	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	DICHLOROMETHANE	Y	2900	1500	1400	1991
328	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHYL ISOBUTYL KETONE	N	450	200	250	1991
329	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	TOLUENE	N	60	10	50	1991
330	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	HYDROCHLORIC ACID	N	600	300	300	1991
331	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	AMMONIA	N	125	100	25	1991
332	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	SULFURIC ACID	N	0	0	0	1991
333	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	METHANOL	N	300	200	100	1992
334	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	ACETONITRILE	Y	42	2	40	1992
335	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	DICHLOROMETHANE	Y	1769	915	854	1992
336	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	HYDROCHLORIC ACID	N	360	180	180	1992
337	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	DICHLOROMETHANE	Y	1815	250	1565	1994
338	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	TOLUENE	N	255	5	250	1994
339	CONSOLIDATED PH	6110 ROBINWOOD	21225KNSCL6118R	24003	####	39.208	76.6269	2834	HYDROCHLORIC ACID	N	250	0	250	1994
64	ATOTECH USA INC.	1900 CHESAPEAK	21226MTCHM1900C	24510	####	39.239	76.5724	2819	ANTIMONY	N	7079	250	6829	1987
65	ATOTECH USA INC.	1900 CHESAPEAK	21226MTCHM1900C	24510	####	39.239	76.5724	2819	BARIUM	N	500	250	250	1987
66	ATOTECH USA INC.	1900 CHESAPEAK	21226MTCHM1900C	24510	####	39.239	76.5724	2819	CHROMIUM	Y	500	250	250	1987
67	ATOTECH USA INC.	1900 CHESAPEAK	21226MTCHM1900C	24510	####	39.239	76.5724	2819	ZINC (FUME OR DUST)	N	500	250	250	1987
68	ATOTECH USA INC.	1900 CHESAPEAK	21226MTCHM1900C	24510	####	39.239	76.5724	2819	NITRIC ACID	N	500	250	250	1987
69	ATOTECH USA INC.	1900 CHESAPEAK	21226MTCHM1900C	24510	####	39.239	76.5724	2819	NITRIC ACID	N	500	250	250	1988
70	ATOTECH USA INC.	1900 CHESAPEAK	21226MTCHM1900C	24510	####	39.239	76.5724	2819	ANTIMONY COMPOUNDS	N	4434	250	4184	1988

Data Retrieved from FINDS

FINDS zip code 21225

3 PGS

TABLE 3 FACILITY DATA IN ZIP CODE 21225

	A	B	C	D	E	F	G	H	I	J	K
1	FACILITY	FACILITY NAME	FACILITY ADDRESS	CITY	STATE	ZIP	REGION	COUNTY CODE	COUNTY NAME	NO OF PO	NO OF PO
2	ID					CODE				SYSTEMS	RECORDS
3	MD0000825745	BROOKLYN PARK ELEMENTARY	200 14TH ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
4	MDD985378876	ACME ANTI SKID CORP	3437 S HANOVER ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
5	MDD063208979	ALBAN ENGINE POWER INC	1401 CHERRY HILL RD	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
6	MDD094884095	AMERICAN DISH SVCE OF BALTIMOR	4701 BELLE GROVE RD BLDG G	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
7	MDD069372746	AMERICAN TANK TRANSPORT INC	6350 ORDNANCE POINT RD	CURTIS BAY	MD	21225	3	3	ANNE ARUNDEL	1	1
8	MDD985386945	AMOCO #715-TANKS	101 W PATAPSCO AVE	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
9	MDD985387620	AMOCO #84813-TANKS	5502 RITCHIE HWY	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
10	MDD985407337	ANSAM METALS CORP	1026 E PATAPSCO AVE	BALTIMORE	MD	212252229	3	3	ANNE ARUNDEL	2	3
11	MDD985382043	B & G BODY WORKS INC	3 SEWARD AVE	BROOKLYN PARK	MD	21225	3	3	ANNE ARUNDEL	1	1
12	MDD985398577	B&J TRUCK & EQUIP REPAIR SER	601 W PATAPSCO AVE	BALTIMORE	MD	212251636	3	3	ANNE ARUNDEL	1	1
13	MDD981106131	BALTIMORE HARBOR TUNNEL	FRANKFURST AVE NEAR CHILDS ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
14	MDD981937378	BROOKLYN MEDICAL CTR	3721 POTEE ST STE 1	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
15	MDD022411045	BROOKLYN MOTORS INC	2900 S HANOVER ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	3
16	MDD985369362	BROOKLYN PARK JR HIGH	200 HAMMONS LANE	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
17	MDD985398940	BROOKLYN SVC CTR	900 E PATAPSCO AVE	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	3
18	MDD985372218	BROWNS BODY & FENDER	516 PONTIAC AVE	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	3
19	MDD022432736	BROWNS HONDA CITY HONDA	5810 RITCHIE HWY	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
20	MDD985380864	CAPITOL AWARDS & PRO	3835 S HANOVER ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
21	MDD990810061	CHEMICAL SPECIALTIES MFG CORP	PATAPSCO AVE	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	2
22	MDD980712608	CHESAPEAKE & POTOMAC TELE CO	1401 N RITCHIE HWY	GLEN BURNIE	MD	21225	3	3	ANNE ARUNDEL	1	1
23	MDD980713838	CHESAPEAKE & POTOMAC TELE CO	206-212 FRANKLE ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
24	MDD980918205	CLEAN AMERICA INC	3300 CHILD ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	3
25	MDD000604090	COASTAL TANK LINES INC	527 CHESAPEAKE AVE	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	2
26	MDD985413061	CONCRETE TRANSPORT INC	200 FRANKFURST AVE	BALTIMORE	MD	212251600	3	3	ANNE ARUNDEL	2	2
27	MDD985380484	COPANOS CO JOHN D	6110 ROBINWOOD PARK	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
28	MDD985402932	CRANE KIRBY INC	600 W PATAPSCO AVE	BALTIMORE	MD	212251605	3	3	ANNE ARUNDEL	1	1
29	MDD985370634	CROWN STA	5701 RITCHIE HWY	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	3
30	MDD985370477	CROWN STA	3550 POTEE ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	3
31	MDD003062197	DENTOCIDE CHEM CO	3437 S HANOVER ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	4
32	MDD002487585	DREVER CO HEAT TREATING DIV	6201 ROBINWOOD RD	BROOKLYN PARK	MD	21225	3	3	ANNE ARUNDEL	2	3
33	MDD985388875	EXECUTIVE RADIATOR SERVICE INC	6038 BELLE GROVE RD	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
34	MDD981106073	FORT MCHENRY TUNNEL	KEITH & LELAND AVENUES	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
35	MDD985381136	GISCHEL MACHINE CO	5511 MAGIE ST	BROOKLYN	MD	21225	3	3	ANNE ARUNDEL	1	1
36	MDD045674751	HARBISON WALKER REFRACTORIES B	1200 PATAPSCO AVE	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	3	4
37	MDD007996044	JOSEPH J HOCK INC	5500 BELLE GROVE RD	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	3	4
38	MDD985392034	HOUSING AUTHORITY OF BALTIMORE CITY	4140 10TH STREET	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
39	MDD982567240	IA CONST CORP - BROOKLYN	200 FRANKFURST AVE	BROOKLYN	MD	21225	3	3	ANNE ARUNDEL	1	1
40	MDD003085974	JARVIS STEEL & LUMBER CO INC	3437 NINTH STREET	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	3
41	MDD981102791	K & T AUTO BODY	1 HAMMONDS LN	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
42	MDD082616020	K & T BODY SHOP	5826 RITCHIE HWY	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
43	MDD038942884	KANASCO LTD	6118 ROBINWOOD RD	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	2
44	MDD985412857	KANASCO LTD	6110 ROBINWOOD RD	BALTIMORE	MD	212253835	3	3	ANNE ARUNDEL	1	1
45	MDD003062833	KNIPP & CO	3401 S HANOVER ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	3	5
46	MDD010089365	JS LEES BODY SHOP INC	6033 BELLE GROVE RD	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	3
47	MDD981044647	LORD BALTIMORE CLEANERS	5634 RITCHIE HWY	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	3
48	MDD985408640	MARSHALL BODY SHOP	3570 2ND ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
49	MDD985396944	CLASSIC AUTO BODY SPECIALIST	3570 2ND ST	BROOKLYN	MD	21225	3	3	ANNE ARUNDEL	1	1
50	MDD074920968	MATLACK INC	4801 BELLE GROVE RD	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	2	3
51	MDD053940177	MODERN TRASHMOVAL INC	901 BALTIC AVE	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
52	MDD980554406	MORLOCK PETROLEUM EQUIPMENT SVC INC	4700 BELLE GROVE RD BLDG 16	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	1
53	MDD985379205	NEENAN BUSINSS FORMS	3917 S HANOVER ST	BALTIMORE	MD	21225	3	3	ANNE ARUNDEL	1	3

Dun and Bradstreet Facility Data

Dunn & Bradstreet Zip code 21226

n FINDS?

TABLE 2: FACILITIES WITH POTENTIAL ENVIORNMENTAL RELEASES IN ZIP CODE 21226

3 PGS

	A	B	C	D	E	F	G	H	I	J	K
1	COMPANY NAME	ADDRESS	CITY	STATE	ZIP	TEL	SIC CODE	BUSINESS DESCRIPTION	SALES	TOTAL EMPLOYEES	NAME OF OWNER
3	A SMITH & SONS	PENNINGTON AVE	BALTIMORE	MD	212261620	4103557626	3731	SHIPBLDING REPAIRN	$252,411	4	JOSEPH G SMITH
4	ACME PLATING COMPANY INC	BENHILL AVE	BALTIMORE	MD	212261434	4103556821	3471	PLATING POLISHING	$500,000	8	GEORGE SCHUMANN JR
5	AGRO MOTORS INC	FORT SMALLWOOD RD	BALTIMORE	MD	212261802	4103543900	5012	AUTO OTHR MTR VHCLS	$150,000	2	MICHAEL AGRO
6	AIRCO INDUSTRIAL GAS INC	GLIDDEN RD	BALTIMORE	MD	212261803	4103541613	5169	CHEM ALLD PRDTS N	$300,000	3	
7	AIRSEAL MANUFACTURING CO INC	CURTIS AVE	BALTIMORE	MD	212261402	4103543971	3442	MTL DOORS SASH TR	$35,000	5	LOUIS ROMM
8	ALLIANCE RFG & SHEET MTL INC	PENNINGTON AVE	BALTIMORE	MD	212261423	4103548001	1761	RFNG SDNG SHT MTL	$4,561,641	45	DAVID COBB
9	ALVEYS TRUCK TIRE & TRLR REPR	ARUNDEL COVE AVE	BALTIMORE	MD	212261703	4107895506	7538	GNRL ATMTVE RPR SHP	$200,000	4	JOHN L ALVEY
10	ALVEYS TRUCK TIRES & TRAILER	ARUNDEL COVE AVE	BALTIMORE	MD	212261703	4107895506	7534	TIRE RTRDNG RPR SH	$190,000	3	DINKY ALVEY
11	AMERADA HESS CORPORATION	PENNINGTON AVE	BALTIMORE	MD	212261619	4103550700	5171	PETRO BLK STNS TMN	$0	0	FRED FLINT
12	AMOCO OIL COMPANY	PENNINGTON AVE	BALTIMORE	MD	212261618	4103555112	4225	GENRL WRHSG STORAG	$0	0	CHRIS HIGGS
13	ATLANTIC WELDERS INC	PENNINGTON AVE	BALTIMORE	MD	212261617	4103551869	7692	WELDING REPAIR	$2,422,735	30	CHARLES KEN HARRIS
14	ATLANTIC WELDERS INC	ON ST	BALTIMORE	MD	21226		7692	WELDING REPAIR	$0	0	
15	ATOTECH USA INC	CHESAPEAKE AVE	BALTIMORE	MD	212261012	4103553700	2899	CHEM PRPRTNS NEC	$0	0	RONALD PELLETIER
16	AUTOMATED PLATING INDUSTRIES	BENHILL AVE	BALTIMORE	MD	212261434	4103554700	3471	PLATING POLISHING	$750,000	15	CHARLES MISERENDINO
17	BALTIMORE GAS AND ELECTRIC CO	BRANDON SHORES RD	BALTIMORE	MD	212261746	4107875300	4911	ELECTRIC SERVICES	$0	0	R W LOWMAN
18	BALTIMORE SCRAP CORP	CARBON AVE	BALTIMORE	MD	212261007	4103554455	5093	SCRAP WASTE MTRLS	$4,300,000	27	DAVID SIMON
19	BAY INSTRUMENTATION & TECH	PITTMAN RD	BALTIMORE	MD	212261721	4107890436	3826	ANALYTCL INSTRMNTS	$0	0	
20	BIOMECHANICAL RESOURCES INC	BENHILL AVE	BALTIMORE	MD	212261434	4103542424	3842	SRGCL APPL SUPPLS	$183,224	6	JOHN SENATORE
21	BOYERS AMOCO STATION	FORT SMALLWOOD RD	BALTIMORE	MD	212261717	4103600359	5541	GASLNE SVC STATIONS	$1,100,000	10	
22	BROWNING-FERRIS INC	QUANTINE RD	BALTIMORE	MD	21226	4103550196	4953	REFUSE SYSTEMS	$0	0	JOHN SGANGA
23	BROWNING-FERRIS INC	CHEMICAL RD	BALTIMORE	MD	212261622		4953	REFUSE SYSTEMS	$0	0	PEGGY O'NEIL
24	BRUCE P MURDOCK INC	-3815 LEO ST	BALTIMORE	MD	21226	4103557788	7699	REPAIR SVCS NEC	$812,510	7	TIMOTHY S MURDOCK
25	BUILT RITE SERVICES	E PATAPSCO AVE	BALTIMORE	MD	212261158	4103542532	7538	GNRL ATMTVE RPR SHP	$140,000	3	
26	BULLET TRAILERS & FABRICATION	HAWKINS POINT RD	BALTIMORE	MD	212261610	4103563641	5561	RCRTNL VHCLE DLRS	$137,132	1	MIKE ROGERS
27	BOC GROUP INC A DELAWARE CORP	FORT ARMISTEAD RD	BALTIMORE	MD	212261803	4103541884	2813	INDUSTRIAL GASES	$0	0	PATRICK SMITH
28	BOC GROUP INC A DELAWARE CORP	E PATAPSCO AVE	BALTIMORE	MD	212261523	4103550624	2813	INDUSTRIAL GASES	$0	0	AL KELLER
29	BP AMERICA INC	NORTHBRIDGE AVE	BALTIMORE	MD	212261536	4103557200	5171	PETRO BLK STNS TMN	$0	0	RANDY ROBERTS
30	CAMPBELL BODY	LEO ST	BALTIMORE	MD	212261521	4103557621	7538	GNRL ATMTVE RPR SHP	$140,000	3	
31	CENTRAL OIL ASPHALT CORP	ASIATIC AVE	BALTIMORE	MD	212261506	4103556363	2951	ASPH PVNG MXT BLCK	$0	0	ROBERT A SHANK
32	CHEMETALS INCORPORATED	PITTMAN RD	BALTIMORE	MD	212261792	4107898800	2819	IND INORG CHEM NEC	$60,000,000	285	RICHARD L MULHOLLAND
33	CHEMETALS INCORPORATED	PITTMAN RD	BALTIMORE	MD	212261792	4107898800	2819	IND INORG CHEM NEC	$0	0	RICHARD MULHOLLAND
34	CHESAPEAKE COATING INC	BENHILL AVE	BALTIMORE	MD	212261434	4103554200	3479	MTL CTNG ALLD SVCS	$1,700,000	9	GEORGE SCHUMANN JR
35	CHESAPEAKE CORPORATION	PITTMAN RD	BALTIMORE	MD	212261721	4107899400	2653	CRRGTD SLD FBR BXS	$0	0	ROBERT S ARGABRIGHT
36	CHESAPEAKE CORPORATION	PITTMAN RD	BALTIMORE	MD	212261721	4107899440	5093	SCRAP WASTE MTRLS	$0	0	GREG ISAAC
37	CHESAPEAKE PRINTING & MAILING	E ORDNANCE RD	BALTIMORE	MD	212261741	4107688757	2752	COMMRCL PRTNG LITH	$1,000,000	17	GARY RANKIN
38	CHESAPEAKE PRINTING & MAILING	E ORDNANCE RD STE 40	BALTIMORE	MD	212261741	4107660008	2759	COMMRCL PRINTNG NE	$0	20	GARY RANKIN
39	CHESAPEAKE VENTURE INC	CHESAPEAKE AVE	BALTIMORE	MD	212261051	4106251370	4491	MARINE CARGO HNDLNG	$1,500,000	2	WILLIAM KROH
40	CHEVRON USA INC	CHESAPEAKE AVE	BALTIMORE	MD	212261013	4105763795	5032	BRCK STN RLTD MTR	$0	0	JAMES D FREDERICK
41	CITY OF BALTIMORE	ASIATIC AVE	BALTIMORE	MD	212261507	4103962800	4953	REFUSE SYSTEMS	$0	0	BURTON D SKLAR
42	CLEAN AMERICA INC	CHILDS ST	BALTIMORE	MD	212261016	4103540751	4953	REFUSE SYSTEMS	$4,000,000	39	CURTIS COLICHER
43	COLONIAL PIPELINE COMPANY	FAIRFIELD RD	BALTIMORE	MD	212261516	4103558155	4613	RFND PETRO PPELINES	$0	0	TOM TILLER
44	COLOR PRELUDE INC	ENERGY PKY	BALTIMORE	MD	212261733	4104377725	2844	TOILET PREPARATIONS	$0	0	STAN GARLAND
45	COLUMBIA FLEET SERVICE INC	COVE AVE	BALTIMORE	MD	212261607	4107968795	7538	GNRL ATMTVE RPR SHP	$140,000	3	
46	COMILOG US INC	PITTMAN RD	BALTIMORE	MD	212261792	4107898800	2819	IND INORG CHEM NEC	$85,000,000	430	RICHARD MULHOLLAND
47	COMMERCIAL EQUIPMENT COMPANY	NORTHBRIDGE AVE	BALTIMORE	MD	212261536	4104850399	7538	GNRL ATMTVE RPR SHP	$0	0	
48	COMMERCIAL TESTING & ENGRG CO	ENERGY PKY STE 1002	BALTIMORE	MD	212261798	4102558688	8731	COMMRCL PHYS RSRCH	$0	0	BILLY L GREER
49	CONTRACT MATERIALS PROCESSING	BENHILL AVE	BALTIMORE	MD	212261433	4103541600	5169	CHEM ALLD PRDTS N	$1,800,000	11	DR EDWIN ALBERS
50	CORROSION REPAIR & SERVICES	PENNINGTON AVE	BALTIMORE	MD	212261430	4103552838	1799	SPCL TRD CNTRS NEC	$1,400,000	22	CHET ZANESKI
51	COTTMAN COMPANY	CARBIDE RD	BALTIMORE	MD	212261704	4106317891	4491	MARINE CARGO HNDLNG	$390,000	4	DAVID H MURDOCK

not elsewhere classified

MDE Facility Data

MDE Facility Data

Facility Name:	FMC Corp.
Street Address:	1701 East Papatsco Ave.
City:	Baltimore
County:	
Zip:	21226
Contact Name:	Michael Altman
Contact Ph.#s:	(410) 354-5706
IMDE Permit #	24-00073
SIC code(s):	2879
Type of Business:	Agricultural Chemical Mfg.
Latitude:*	
Longitude*:	
Census Tract #	250500
Emission Rate:	
Process/Equipment Generating Emission (MDE Code)	24-0073-2-0209
Emission Control Equipment Present? (Yes/no)	Yes
Total Amounts Emitted in Prior Years	
Enforcement/Compliance History (RTKnet)	
Data Element for any onsite monitoring capacity and information:	
Source Category:	Incinerator (Hg3 Waste)
StackHeight:	52 ft.
Stack: Elevation of Stack Base (meters)	
Stack Exit Velocity:	25 fps
Stack Inner Diameter:	40 in.
Stack Exit Temp.:	120 F
Stack: Height of Adj. Bldg.	
Stack: Width of Adj. Bldg.	
Stack:Length of Adj. Bldg.	
Fugitive:Elevation of Area Source	
Fugitive:Effective Emission Height of Area Source	
Fugitive:Width of Square Area Source	

* UTM: Zone 18; Easting 3636; Northing 4343.3

APPENDIX G

Example of Database Columns Developed for the Community Pilot Project Air Emissions Database

Column	Column Header
B	Name
C	Street Address
D	City
E	County
F	ZIP Code
G	Contact Name
H	Contact Phone Number
I	SIC Code(s)
J	Type of Business
K	Latitude
L	Longitude
M	MDE Coordinate East
N	MDE Coordinate North
O	Census Tract Number
P	TRI Facility ID Number
Q	MDE Permit Number
R	Number of Employees
S	Pollutant Name (*=on-site monitoring)
T	CAS Number
U	Carcinogen (Y/N)
V	TRI Chemical (X=Yes)
W	OSHA Chemical (X=Yes)
AB	Cancer Slope Factor (QSTAR) (mg/kg/day)
AD	Reference Concentration (RfC) (mg/m^3)
AE	Inhalation Cancer Slope Factor mg/kg-day
AF	Inhalation Reference Dose (RfD) mg/kg-day
AG	Reference Dose (RfD) mg/kg/day
AN	Total Air Emissions (tons/yr) (1994) TRI
AO	Total Air Emissions (lbs/yr) (1994) TRI
AP	Total Air Emissions (tons/yr) (1995) MDE
AQ	Total Air Emissions (lbs/yr) (1995) MDE
AR	Total Air Emissions (tons/yr) TAP
AS	Total Air Emissions (lbs/yr) TAP

Column	Column Header
AT	Total Air Emissions (tons/yr) TAP*
AU	Total Air Emissions (lbs/yr) TAP*
AV	Maximum Total Air Emissions (lbs/yr)
AW	Potential Dose (mg/kg-day) Turner - Vent
AY	Risk (dose*SF) (based on Turner)
AZ	Hazard (dose/RfD) (based on Turner)
BC	Stack Emissions (lbs/yr) (1995)
BD	Stack Emissions (1995) tons/yr
BE	Fugitive Emissions (lbs/yr) (1995)
BF	Fugitive Emissions (1995) tons/yr
BG	Monitored Concentrations (ppb) Avg. (Max.) 1996
BI	Primary Data Source
BQ	Enforcement Compliance History (RTKNET)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Name	Street Address	City	County	Zip	Contact Name	Contact Ph.#s	SIC Code	Type of Business	Latitude	Longitude	MDE Coord. East	MDE Coord. North	Census Tract #
2	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
3	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
4	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
5	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
6	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
7	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
8	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
9	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
10	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
11	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
12	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
13	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
14	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
15	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
16	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
17	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
18	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
19	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
20	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
21	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
22	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
23	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
24	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
25	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
26	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
27	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
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31	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
32	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
33	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
34	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
35	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
36	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
37	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
38	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
39	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
40	FMC Agricultural Chemical	1701 East Patapsco Ave.	Baltimore		21226	John Sanderson	410-355-6400	2869, 5191	Farm Supplies	39.2321	76.5843	919	509	250500
41	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
42	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
43	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
44	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
45	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
46	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
47	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
48	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
49	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
50	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
51	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
52	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
53	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
54	Rhone-Poulenc Specialty Chemicals	3440 Fairfield Rd.	Baltimore		21226	Itshak Rosner	410-355-2600	2869		39.2358	76.5785			
55	Atotech U.S.A.	1900 Chesapeake Ave.	Baltimore		21226-1012	Ronald Pelletier	410-355-3700	2819, 2899		39.2386	76.5724	913	512	250600
56	Atotech U.S.A.	1900 Chesapeake Ave.	Baltimore		21226-1012	Ronald Pelletier	410-355-3700	2819, 2899		39.2386	76.5724	913	512	250600
57	Atotech U.S.A.	1900 Chesapeake Ave.	Baltimore		21226-1012	Ronald Pelletier	410-355-3700	2819, 2899		39.2386	76.5724	913	512	250600
58	Atotech U.S.A.	1900 Chesapeake Ave.	Baltimore		21226-1012	Ronald Pelletier	410-355-3700	2819, 2899		39.2386	76.5724	913	512	250600
59	Atotech U.S.A.	1900 Chesapeake Ave.	Baltimore		21226-1012	Ronald Pelletier	410-355-3700	2819, 2899		39.2386	76.5724	913	512	250600

A	P	Q	R	S	T	U	V	W	AB	AD	AE	AF
1	TRI Facility ID #	MDE Permit #	Number of Employees	Pollutant Name (*=on-site monitoring)	CAS #	Carcinogen (Y/N) [For source see column AJ]	TRI Chemical	OSHA*	Cancer Slope Factor QSTAR (q1*) (mg/kg-day)-1	Reference Concentration (RfC) mg/m3	Inhalation Cancer Slope Factor (mg/kg-day)-1	Inhalation Reference Dose (RfD) mg/kg-day
2	21226FMCCR1701E		285	Acetic acid, methyl ester, methyl acetate	79209				0	0		
3	21226FMCCR1701E		285	Acetone	67641	N (R)	delisted		0	0		
4	21226FMCCR1701E		285	Acetonitrile	75058	Y-Inhal. (R)	X	X	0	0.05		0.0143
5	21226FMCCR1701E		285	Ammonia	7664417	N (S)	X		0	0.1		0.0286
6	21226FMCCR1701E		285	Benzene	71432	Y-Inhal. (R)	X	X	0.029	0	0.029	0.00171
7	21226FMCCR1701E		285	Benzoyl peroxide	94360		X		0	0		
8	21226FMCCR1701E		285	Carbon monoxide (CO)	630080				0	0		
9	21226FMCCR1701E		285	Carbon tetrachloride	56235	Y-Inhal. (R)	X	X	0.13	0	0.0525	0.000571
10	21226FMCCR1701E		285	Catechol	120809		X		0	0		
11	21226FMCCR1701E		285	Chlorine	7782505	N (R)	X		0	0		
12	21226FMCCR1701E		285	Chloroform (Trichloromethane)	67663	Y-Inhal. (R)	X	X	0.0061	0	0.0805	
13	21226FMCCR1701E		285	Chloromethane (Methyl chloride)	74873	Y-Inhal. (R)	X		0	0	0.0063	
14	21226FMCCR1701E		285	Cyanide & compounds	57125				0	0		
15	21226FMCCR1701E		285	Ethanol (Ethyl alcohol)	64175				0	0		
16	21226FMCCR1701E		285	Ethion	563122				0	0		
17	21226FMCCR1701E		285	Ethylbenzene	100414	N (R) (S)	X		0	1		0.286
18	21226FMCCR1701E		285	Ethylene glycol	107211	N (R)	X		0	0		
19	21226FMCCR1701E		285	Heptane	142825				0	0		
20	21226FMCCR1701E		285	Hydrochloric acid (Hydrogen chloride)	7647010	N (S)	X		0	0.02		0.00571
21	21226FMCCR1701E		285	Hydrogen cyanide (Hydrocyanic acid)	74908		X		0	0.003		0.000857
22	21226FMCCR1701E		285	Hydrogen peroxide	7722841				0	0		
23	21226FMCCR1701E		285	Isopropyl alcohol	67630		X		0	0		
24	21226FMCCR1701E		285	Methanol	67561	N (R) (S)	X		0	0		
25	21226FMCCR1701E		285	Methyl isobutyl ketone	108101	N (R) (S)	X		0	0.08		0.0229
26	21226FMCCR1701E		285	Methylene bromide	74953		X		0	0		
27	21226FMCCR1701E		285	Nitrogen oxides (NOx)	0-01-1							na
28	21226FMCCR1701E		285	Nitrophenol-2 (Nitrophenol, o-)	88755		X		0	0		
29	21226FMCCR1701E		285	Particulates	0-01-2							na
30	21226FMCCR1701E		285	Phenol	108952		X		0	0		
31	21226FMCCR1701E		285	Phosphoric acid	7664382	N (R) (S)	X		0	0.01		0.00286
32	21226FMCCR1701E		285	Pyridine	110861	Y (R)	X		0	0		
33	21226FMCCR1701E		285	Sodium cyanide (Na(CN))	143339				0	0		
34	21226FMCCR1701E		285	Sodium hydroxide	1310732				0	0		
35	21226FMCCR1701E		285	Sodium sulfate (solution)	7757826				0	0		
36	21226FMCCR1701E		285	Sulfur oxides (SOx)	0-01-3							na
37	21226FMCCR1701E		285	Sulfuric acid	7664939	N (S)	X		0	0		
38	21226FMCCR1701E		285	Toluene	108883	N (R)	X		0	0.4		0.114
39	21226FMCCR1701E		285	Volatile Organic Compounds (VOCs)	0-01-4							na
40	21226FMCCR1701E		285	Xylene	1330207	N (R) (S)	X		0	0		
41	21226LCLC 3440F		105	Acrylic acid	79107	N (R) (S)	X		0	0.001		0.000286
42	21226LCLC 3440F		105	Ammonia	7664417	N (S)	X		0	0.1		0.0286
43	21226LCLC 3440F		105	Carbon monoxide (CO)	630080				0	0		
44	21226LCLC 3440F		105	Dioxane (1,4-)	123911		X		0.011	0		
45	21226LCLC 3440F		105	Ethylene oxide	75218	Y (R)	X	X	1.02	0	0.35	
46	21226LCLC 3440F		105	Formaldehyde	50000	Y (R) (S)	X	X	0.045	0	0.0455	
47	21226LCLC 3440F		105	Glycol ethers	0-00-5							na
48	21226LCLC 3440F		105	Hydrochloric acid (Hydrogen chloride)	7647010	N (S)	X		0	0.02		0.00571
49	21226LCLC 3440F		105	Isopropyl alcohol	67630		X		0	0		
50	21226LCLC 3440F		105	Methanol	67561	N (R) (S)	X		0	0		
51	21226LCLC 3440F		105	Nitrogen oxides (NOx)	0-01-1							na
52	21226LCLC 3440F		105	Sulfur oxides (SOx)	0-01-3							na
53	21226LCLC 3440F		105	Sulfuric acid	7664939	N (S)	X		0	0		
54	21226LCLC 3440F		105	Volatile Organic Compounds (VOCs)	0-01-4							na
55				Carbon monoxide (CO)	630080				0	0		
56	21226MTCHM1900C			Chromium & compounds	7440473	Y-Inhal. (R)	X		0	0.0005	4.20E+001	0.000000571
57	21226MTCHM1900C			Nitric acid	7697372	N (S)	X		0	0		
58				Nitrogen oxides (NOx)	0-01-1							na
59	21226MTCHM1900C			Zinc & compounds (fume or dust)	7440666	N (R) (S)	X					

A	AG	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AY
1	Reference Dose (RfD) mg/kg/day	Total Air Emissions (tons/yr) (1994) TRI	Total Air Emissions (lbs/yr) (1994) TRI	Total Air Emissions (tons/yr) (1995) MDE	Total Air Emissions (lbs/yr) (1995) MDE	Total Air Emissions (tons/yr) (?) TAP	Total Air Emissions (lbs/yr) (?) TAP	Total Air Emissions (tons/yr) (?) TAP*	Total Air Emissions (lbs/yr) (?) TAP*	Maximum Total Air Emissions (lbs/yr)	Potential Dose (mg/kg-day) Turner - Vent	Risk (dose*SF) (based on Turner)
2	1					0.2001	400.2			400.2	0.0003055095794	0.00E+000
3	0.1					1.086	2172			2172	0.0016580879723	0.00E+000
4	0.006	0.1785	357			2.185	4370			4370	0.0033360241431	0.00E+000
5	0	0.1945	389			0.0131	26.2			389	0.0002969595862	0.00E+000
6	0.003					0.1752	350.4			350.4	0.0002674926452	7.76E-006
7	0					0.0013	2.6			2.6	0.0000019848199	0.00E+000
8	0			14.67	29340					29340	0.022397928686	0.00E+000
9	0.0007	0.0915	183			0.8935	1787			1787	0.0013641819551	7.16E-005
10	0	0.0055	11			0.3257	651.4			651.4	0.0004972737132	0.00E+000
11	0.1	10.8075	21615			0.1156	231.2			21615	0.0165007235361	0.00E+000
12	0.01					0.0902	180.4			180.4	0.0001377159623	1.11E-005
13	0	0.091	182			2.3392	4678.4			4678.4	0.0035714543137	2.25E-005
14	0.02	0.0005	1			0.0357	71.4			71.4	0.0000545062068	0.00E+000
15	0					12.598	25196			25196	0.019234431192	0.00E+000
16	0.0005							0.00004	0.08	0.08	0.0000000610714	0.00E+000
17	0.1	0.0375	75			0.8864	1772.8			1772.8	0.0013533417851	0.00E+000
18	2	0.0215	43			1.6114	3222.8			3222.8	0.0024602605511	0.00E+000
19	0					1.855	3710			3710	0.0028321852565	0.00E+000
20	0	22.835	45670			353.904	707808			707808	0.5403351434015	0.00E+000
21	0.02							0.00004	0.08	0.08	0.0000000610714	0.00E+000
22	0							0.00004	0.08	0.08	0.0000000610714	0.00E+000
23	0					0.027	54			54	0.0000412231816	0.00E+000
24	0.5	3.4335	6867			11.6876	23375.2			23375.2	0.0178444465788	0.00E+000
25	0.08	0.3575	715			1.2106	2421.2			2421.2	0.0018483253216	0.00E+000
26	0.01	0.543	1086							1086	0.0008290439861	0.00E+000
27	na			74.77	149540					149540	0.114157677427	0.00E+000
28	0					0.203	406			406	0.0003099372545	0.00E+000
29	na			7.78	15560					15560	0.0118783834477	0.00E+000
30	0.6							0.00004	0.08	0.08	0.0000000610714	0.00E+000
31	0					0.0558	111.6			111.6	0.0000851945754	0.00E+000
32	0.001					0.0486	97.2			97.2	0.0000742017269	0.00E+000
33	0.04							0.00004	0.08	0.08	0.0000000610714	0.00E+000
34	0					0.643	1286			1286	0.0009817224366	0.00E+000
35	0					0.0159	31.8			31.8	0.0000242758736	0.00E+000
36	na			83.82	167640					167640	0.1279750771958	0.00E+000
37	0	0.0005	1			0.004	8			8	0.000006107138	0.00E+000
38	0.2	1.0545	2109			7.8141	15628.2			15628.2	0.0119304467993	0.00E+000
39	na			23.54	47080					47080	0.035940507244	0.00E+000
40	2	0.2955	591			4.924	9848			9848	0.0075178869018	0.00E+000
41	0.5	0.013	26			0.014	28			28	0.0000213749831	0.00E+000
42	0	0.043	86			0.014	28			86	0.0000656517337	0.00E+000
43	0			0.36	720					720	0.0005496424217	0.00E+000
44	0					0.029	58			58	0.0000442767506	0.00E+000
45	0	0.1475	295							295	0.0002252007145	7.88E-005
46	0.2	0.015	30							30	0.0000229017676	1.04E-006
47	na	0.005	10							10	0.0000076339225	0.00E+000
48	0	0.1205	241							241	0.0001839775328	0.00E+000
49	0					0.0665	133			133	0.0001015311696	0.00E+000
50	0.5					0.03	60			60	0.0000458035351	0.00E+000
51	na			1.64	3280					3280	0.0025039265879	0.00E+000
52	na			0.18	360					360	0.0002748212109	0.00E+000
53	0	0.0025	5							5	0.0000038169613	0.00E+000
54	na			5.25	10500					10500	0.0080156186504	0.00E+000
55	0			0.12	240					240	0.0001832141406	0.00E+000
56	0.07	0.0005	1							1	0.0000007633923	3.21E-005
57	0	0.0005	1							1	0.0000007633923	0.00E+000
58	na			8.89	17780					17780	0.013573114248	0.00E+000
59	0.3	0.0005	1							1	0.0000007633923	0.00E+000

A	AZ	BC	BD	BE	BF	BG	BI	BQ
1	Hazard (dose/ RfD) (based on Turner)	Stack Emissions (lbs/yr) (1995)	Stack Emissions (1995) tons/yr	Fugitive Emissions (lbs/yr) (1995)	Fugitive Emissions (1995) tons/ yr	Monitored Emissions (ppb) Avg. (Max.) 1996	Primary Data Source	Enforcement Compliance History (RTKnet)
2	ERR						TAP	
3	ERR						TAP	
4	0.2332884016						TAP	
5	0.0103832023						TAP	
6	0.1564284475						TAP	
7	ERR						TAP	
8	ERR						1995 MDE Emissions Statement	
9	2.3891102541						TAP	
10	ERR						TAP	
11	ERR						TAP	
12	ERR						TAP	
13	ERR						TAP	
14	ERR						TAP	
15	ERR						TAP	
16	ERR						TAP (reported value=0.0000)	
17	0.0047319643						TAP	
18	ERR						TAP	
19	ERR						TAP	
20	94.629622312						TAP	
21	0.0000712618						TAP (reported value=0.0000)	
22	ERR						TAP (reported value=0.0000)	
23	ERR						TAP	
24	ERR						TAP	
25	0.0807128961						TAP	
26	ERR						1994 TRI Form R	
27	ERR						1995 MDE Emissions Statement	
28	ERR						TAP	
29	ERR						1995 MDE Emissions Statement	
30	ERR						TAP (reported value=0.0000)	
31	0.0297883131						TAP	
32	ERR						TAP	
33	ERR						TAP (reported value=0.0000)	
34	ERR						TAP	
35	ERR						TAP	
36	ERR						1995 MDE Emissions Statement	
37	ERR						TAP	
38	0.1046530421						TAP	
39	ERR						1995 MDE Emissions Statement	
40	ERR						TAP	
41	0.074737703						TAP	
42	0.0022955152						TAP	
43	ERR						1995 MDE Emissions Statement	
44	ERR						TAP	
45	ERR						1994 TRI Form R	
46	ERR						1994 TRI Form R	
47	ERR						1994 TRI Form R	
48	0.0322202334						1994 TRI Form R	
49	ERR						TAP	
50	ERR						TAP	
51	ERR						1995 MDE Emissions Statement	
52	ERR						1995 MDE Emissions Statement	
53	ERR						1994 TRI Form R	
54	ERR						1995 MDE Emissions Statement	
55	ERR						1995 MDE Emissions Statement	
56	1.3369391461						1994 TRI Form R	
57	ERR						1994 TRI Form R	
58	ERR						1995 MDE Emissions Statement	
59	ERR						1994 TRI Form R	

APPENDIX H

Facilities Modeled for Secondary Screen

Appendix H - Baltimore Facilities and Pollutants Modeled for Secondary Screen

Facility Name	Pollutant Name	Emission Rate (lb/yr)
Amoco Oil Co.	Toluene	9,746
	Benzene	4,000
Baltimore City Composting	Ammonia	206,660
	Benzene	7,156*
	Carbon tetrachloride	2,820
	Toluene	8,436
	Vinyl chloride	5,720
Baltimore Resco	Arsenic	630
	Cadmium	703
	Chromium	3,333
	Formaldehyde	4,355
	Hydrogen chloride	6,126,000
	Hydrogen fluoride	77,651
	Mercury	15,837
Bethlehem Steel	Cadmium	551
	Chromium	848
	Lead	958
	Manganese	20,124
BGE- Brandon Shores	Carbon monoxide	2,114,980
	Nitrogen oxides	45,987,400
	Sulfur oxides	93,865,380
	Arsenic	1,443
	Cadmium	178
	Chromium	909
	Lead	1,468
	Mercury	290
	Nickel	978
	Hydrogen Chloride	4,200,000
	Hydrogen Fluoride	5,200,000
	Dioxins and Furans	0.0062
BGE- Wagner Station	Carbon monoxide	816,140
	Nitrogen oxides	27,567,540
	Sulfur oxides	35,993,240
	Arsenic	462
	Cadmium	64
	Chromium	294
	Lead	477
	Mercury	91
	Nickel	2,167
	Hydrogen Chloride	1,300,000
	Hydrogen Fluoride	160,000
	Dioxins and Furans	0.0019
Bayway Terminal	Benzene	1,120

Facility Name	Pollutant Name	Emission Rate (lb/yr)
Brooklyn Service Station	Toluene	141
Chemetals Corp.	Ammonia	59,568
	Hydrochloric acid	23,172
	Manganese	61,661
	Sulfuric acid	3,621
Citgo Station	Benzene	122
	Toluene	186
CONDEA-Vista Chem.	Benzene	3,000
	Hydrochloric acid	21,000
FMC Agricultural Chemical	Carbon tetrachloride	1,787
	Chloromethane	4,678
	Hydrochloric acid	707,808
	Toluene	15,628
Grace Davison	Ammonia	290,000
	Chromium	122
	Molybdenum trioxide	1,180
	Nitrogen oxides (NOx)	237,780
	Sulfuric acid	3,000
Hobelmann Port Ser.	Stoddard solvent	30,380
J.S. Lee's Body Shop, Inc.	Toluene	263
Med Net/MedX Inc.	Dioxins & Furans	0.00000199
	Hydrochloric acid	42,300
Mobil Oil(Maritank)	Benzene	882
	Toluene	5,291
Norris Farm Landfill	1,2-Dichloropropane	2,365
	Benzene	1,051
	Methyl chloride	2,365
	Methylene chloride	11,388
	Vinyl chloride	2,628
Phoenix Services	Dioxins & Furans	0.00282
	Hydrochloric acid	91,016
Pori International	Hydrogen sulfide	2,640
Quebecor Printing	Toluene	3,250,000
SCM Chem.- Millennium	Carbon monoxide (CO)	19,028,940
	Carbonyl sulfide	1,562,400
Millennium (cont.)	Sulfur oxides (SOx)	2,306,640
	Sulfuric acid	39,900
Shell Oil Terminal	Benzene	1,400
	Xylenes (m-,o-,p-)	1,500
MOTIVA	Benzene	130
	Toluene	199
U.S. Coast Guard	Toluene	8,054
U.S. Gypsun	Chromium	26.2

* This number was determined to be erroneous. However, the emissions Did not impact the Partnership neighborhoods.

APPENDIX I

Results of Secondary Screening for Target Toxics

Table I-1. Results of Screening for Target Toxics

Estimated air levels (in micrograms per cubic meter of air (g/m^3), based on modeling of facility emissions in four South Baltimore neighborhoods plus the location with the highest estimated air levels.
Exposure guidelines and monitoring results data are provided for comparison. The concentration as a percentage of the applicable comparison guideline is shown below the concentration (in parentheses).

Chemical	Screening Comparison Concentrations (standards and guidelines)	Neighborhood Concentrations (from modeling)					State-operated monitoring station results
		Cherry Hill	Brooklyn/ Brooklyn Park	Curtis Bay	Wagners Point	Point with Highest Concentration	
Ammonia	100 g/m^3 (EPA guideline- IRIS RfC)	0.073 (<1%)	0.129 (<1%)	0.54 (<1%)	0.23 (<1%)		
Arsenic	Carcinogenic 0.00041 g/m^3 Non-carcinogenic 1.1 g/m^3	0.00016 (39%) (<1%)	0.0001 (24%) (<1%)	0.00012 (29%) (<1%)	0.0001 (24%) (<1%)		
Benzene	0.22 g/m^3 (EPA guideline - derived from IRIS)	0.003 (1%)	0.008 (4%)	0.019 (9%)	**0.19 (86%)**		**3.38 g/m^3 (2100%)**
1,3-Butadiene	0.0064 g/m^3 (EPA guideline, derived from IRIS)						**0.25 g/m^3 (3900%)**
Cadmium	0.00099 g/m^3	0.00016 (16%)	0.0001 (10%)	0.0001 (10%)	0.0001 (10%)		
Carbon monoxide	10,000 g/m^3 as 8-hour average (EPA NAAQS standard)	1.34 (<1%)	1.87 (<1%)	6.4 (<1%)	2.7 (<1%)		
Carbon tetrachloride	0.12 g/m^3 (EPA guideline - derived from IRIS)	0.0008 (<1%)	0.0026 (2%)	0.022 (18%)	0.009 (7%)		**0.96 g/m^3 (800%)**
Carbonyl sulfide	1,500 g/m^3 (Maryland Standard - Interim Special Screening Level)	0.106 (<1%)	0.149 (<1%)	0.52 (<1%)	0.218 (<1%)		

Table I-1. Results of Screening for Target Toxics (continued)

Chemical	Screening Comparison Concentrations (standards and guidelines)	Neighborhood Concentrations (from modeling)					State-operated monitoring station results
		Cherry Hill	Brooklyn/ Brooklyn Park	Curtis Bay	Wagners Point	Point with Highest Concentration	
Chromium (as Hexavalent form)	0.00015 g/m^3 (EPA guideline - derived from IRIS)	**0.0001 (67%)**	**0.0004 (267%)**	**0.0004 (267%)**	**0.0006 (400%)**		
Chromium (as Trivalent form)	0.0021 g/m^3	(35%)	(20%)	**(260%)**	(20%)		
1,2-Dichloropropane	0.092 g/m^3	0.0002 (<1%)	0.00016 (<1%)	0.0003 (<1%)	0.00024 (<1%)		
Dioxin (2,3,7,8-TCDD)	0.000000054 g/m^3 (Equivalent to $5.4x10^{-8}$) (EPA guideline - derived from HEAST)	0.000000000419 ($4.19x10^{-11}$) (<1%)	0.00000000063 ($6.3x10^{-10}$) (1%)	0.00000000157 ($1.57x10^{-9}$) (3%)	0.00000000097 ($9.7x10^{-10}$) (2%)		
Formaldehyde	0.14 g/m^3	0.00089 (<1%)	0.00042 (<1%)	0.0004 (<1%)	0.00034 (<1%)		
Hydrochloric acid	21 g/m^3 (EPA guideline - IRIS RfC) 7 g/m^3 (Maryland Standard - Acceptable Ambient Level)	1.51 (7%) (22%)	1.51 (7%) (22%)	**3.67 (18%)** **(52%)**	**8.43 (40%)** **(120%)**		
Hydrogen fluoride	25 g/m^3 TLV/100	0.09554 (<1%)	0.09875 (<1%)	0.11052 (<1%)	0.10827 (<1%)		
Hydrogen sulfide	1 g/m^3	0.00026 (<1%)	0.00036 (<1%)	0.0006 (<1%)	0.00045 (<1%)		
Lead	3.5 g/m^3	0.00006 (<1%)	0.00008 (<1%)	0.00011 (1%)	0.00011 (<1%)		
Manganese	0.052 g/m^3 (EPA guideline - IRIS RfC)	0.0145 (28%)	0.0244 (47%)	**0.039 (75%)**	**0.0546 (105%)**		

Table I-1. Results of Screening for Target Toxics (continued)

Chemical	Screening Comparison Concentrations (standards and guidelines)	Neighborhood Concentrations (from modeling)					State-operated monitoring station results
		Cherry Hill	Brooklyn/ Brooklyn Park	Curtis Bay	Wagners Point	Point with Highest Concentration	
Mercury	0.31 g/m^3	0.00325 (1%)	0.00153 (<1%)	0.00145 (<1%)	0.00125 (<1%)		
Methyl chloride	0.99 g/m^3 (EPA guideline - derived from HEAST)	0.001 (<1%)	0.0052 (<1%)	0.051 (5%)	0.02 (2%)		**1.26 g/m^3 (127%)**
Methylene chloride	3.8 g/m^3	0.00081 (<1%)	0.00078 (<1%)	0.00148 (<1%)	0.00114 (<1%)		
Molybdenum trioxide	18 g/m^3 (EPA guideline - derived from IRIS reference dose for molybdenum)	0.0002 (<1%)	0.0003 (<1%)	0.0009 (<1%)	0.001 (<1%)		
Nickel	73 g/m^3	0.00007 (<1%)	0.00009 (<1%)	0.00011 (<1%)	0.00011 (<1%)		
Nitrogen oxides	3,700 g/m^3 as annual mean not to be exceeded (EPA NAAQS standard)	1.43 (<1%)	1.76 (<1%)	2.2 (<1%)	2.06 (<1%)		
Stoddard solvent	5,250 g/m^3 (Maryland standard - ambient air level derived from ACGIH TLV/100)	0.006 (<1%)	0.023 (<1%)	0.133 (<1%)	0.044 (<1%)		
Sulfur oxides	80 g/m^3 as annual mean (EPA NAAQS standard)	2.48 (3%)	3.0 (4%)	3.93 (5%)	3.5 (4%)		
Sulfuric acid	10 g/m^3 (Maryland standard - ambient air level derived from ACGIH TLV/100)	0.004 (<1%)	0.005 (<1%)	0.015 (<1%)	0.008 (<1%)		
Toluene	420 g/m^3 (EPA guideline -IRIS RfC)	2.361 (<1%)	2.924 (<1%)	2.605 (<1%)	3.101 (<1%)		12.22 g/m^3 (3%)

Table I-1. Results of Screening for Target Toxics (continued)

Chemical	Screening Comparison Concentrations (standards and guidelines)	Neighborhood Concentrations (from modeling)					State-operated monitoring station results
		Cherry Hill	Brooklyn/ Brooklyn Park	Curtis Bay	Wagners Point	Point with Highest Concentration	
Vinyl chloride	0.021 g/m^3 (EPA guideline - derived from HEAST)	0.001 (5%)	0.002 (8%)	0.006 (27%)	0.003 (13%)		0.00 g/m^3 (0%)
Xylene	7,300 g/m^3 (ATSDR guideline - chronic MRL)	0.0003 (<1%)	0.001 (<1%0	0.031 (<1%)	0.002 (<1%)		27.17 g/m^3 (0.4%)

Table I-2. Evaluation of Combined Exposures for Substances Known to Cause Respiratory Effects

Concentrations and percentages of guidelines for each substance, along with a sum of the individual percentages to provide an estimate of the possible impact from simultaneous exposures

Chemical	Screening Comparison Concentrations (standards and guidelines)	Neighborhood Concentrations (from modeling)					State-operated monitoring station results
		Cherry Hill	Brooklyn/ Brooklyn Park	Curtis Bay	Wagners Point	Point with Highest Concentration	
RESPIRATORY EFFECTS							
Ammonia	100 g/m^3 (EPA guideline- IRIS RfC)	0.073 (<1%)	0.129 (<1%)	0.54 (<1%)	0.23 (<1%)	Not applicable	
Formaldehyde	120 g/m^3	0.00089 (<1%)	0.00042 (<1%)	0.0004 (<1%)	0.00034 (<1%)		
Hydrochloric acid	20 g/m^3 (EPA guideline - IRIS RfC) 7 g/m^3 (Maryland Standard - Acceptable Ambient Level)	1.51 (7%) (22%)	1.51 (7%) (22%)	**3.67 (18%)** **(52%)**	**8.43 (40%)** **(120%)**	Not applicable	
Hydrogen fluoride	25 g/m^3 TLV/100	0.09554 (<1%)	0.09875 (<1%)	0.11052 (<1%)	0.10827 (<1%)		
Nitrogen dioxide	3,700 g/m^3 as annual mean not to be exceeded (EPA NAAQS standard)	1.43 (<1%)	1.76 (<1%)	2.2 (<1%)	2.06 (<1%)	Not applicable	
Sulfur dioxide	80 g/m^3 as annual mean (EPA NAAQS standard)	2.48 (3%)	3.0 (4%)	3.93 (5%)	3.5 (4%)	Not applicable	
Sulfuric acid	10 g/m^3 (Maryland standard - ambient air level derived from ACGIH TLV/100)	0.004 (<1%)	0.005 (<1%)	0.015 (<1%)	0.008 (<1%)	Not applicable	
Total Respiratory Effects	Using higher limits Using lower limit	<15% <30%	<16% <31%	**<27%** **<61%**	**<50%** **<130%**	Not applicable	

APPENDIX J

Partnership Air Committee Report

November 9, 1999 Draft
Report from the Partnership Air Committee

1. What is this report?

For the past several years the Air Committee of the Community Environmental Partnership (CEP) has been working to get a better understanding of the air quality in south Baltimore and northern Anne Arundel County. The first step of this effort has now been completed. This report summarizes the work that has been done and the steps planned for the future. Supporting data is available in a full technical report.

2. What is the Air Quality Committee of the South Baltimore Community Environmental Partnership?

The Air Committee is one of five committees organized by the CEP to get a better understanding of the environment and economy in south Baltimore and northern Anne Arundel County. A list of Air Committee members and their affiliation is attached to this report. The job of the Air Committee is to collect information on the quality of the air in the Partnership neighborhoods and make suggestions for how the air quality can be improved. Air quality ranked first in the list of concerns voted on at the July, 1996, community meeting that began the Partnership. This high interest in air quality is an indication of the widespread community concern about the health of the community in the Partnership neighborhoods and the possible contribution of the environment to those health concerns. The CEP Air Committee has about twenty members including local residents, industry managers and officials from the U.S. EPA, the Maryland Department of Environment (MDE), Baltimore City, Anne Arundel County, and The Johns Hopkins University. All committee members are committed to work together to improve the air quality in the Partnership neighborhoods. The committee has met regularly since its inception. Meetings have been held at the Partnership Office since its opening in March, 1997. Meetings are open to the public**.**

3. What aspects of air quality were studied?

Many community members believe that chronic health problems in Partnership neighborhoods, especially certain types of cancers, may be attributed to outdoor air pollutants released by the factories, utilities, waste facilities and vehicles in and around the Partnership area. Since certain chronic health problems may be caused by long-term exposure to these pollutants, the committee decided to start its work by studying annual ambient concentrations of outdoor air pollutants in Partnership neighborhoods from these sources.

It is important to note, that there are three other aspects of air quality that may have significant chronic health effects that were not a part of this study: ground level ozone, which is a byproduct of the reaction of certain chemicals with sunlight; small particulate matter, especially from diesel exhaust; and short term peak concentrations of certain chemicals that may contribute to health

problems such as asthma. The Air Committee has recommended further work in these areas to evaluate their potential effects on the community. See recommendations in Question 12 below

4. What chemicals are present in outdoor air and where do they come from?

The committee reviewed emission reports from over 125 facilities in and around the Partnership area and air monitoring reports from MDE. 175 chemicals released to, or measured in, the outdoor air in the Partnership neighborhoods were identified during this review. The chemicals originate from a wide variety of sources, including factories, utilities, waste facilities and vehicles.

5. How were the chemicals in outdoor air evaluated?

Given the resources available, the Air Committee decided to use a screening method that could provide the community with information to help identify chemicals that might be a concern. The Committee screening method used two kinds of available information. First, the Committee used available information on air pollutant concentrations from the state air monitoring station located in Fairfield, north of the FMC facility. This is the only air monitoring station located in the Partnership neighborhoods that gathers information on air pollutants. This monitoring station takes air samples every day. Records of the ambient concentrations of 41 different chemicals are available from these samples. The second kind of information used for the screening analysis was the information on air emissions reported by facilities to the EPA's Toxics Release Inventory and to the Maryland Department of Environment under the state permitting program. The Committee used air dispersion computer modeling to estimate the concentrations of air toxics in Partnership neighborhoods that result from these permitted emissions. At the request of the community for information on the possible effects from multiple sources, the Committee used current EPA modeling methodology to combine all the sources for each chemical to get an estimate of the aggregate exposure levels in each Partnership neighborhood. For example, there are twenty stationary sources of benzene in and around the Partnership neighborhoods. These sources were combined in the modeling program to provide an estimate of the total benzene concentration in each neighborhood.

Both the concentrations measured at the monitoring station and the estimated concentrations from area facilities were compared to "screening values" chosen by the committee. A screening value is an air concentration that the committee is confident does not pose a significant human health risk. The committee used U.S. EPA and MDE health effects information to select a screening value for each chemical. Screening values can be based on either cancer risks or risks from other toxic effects. All of the screening values used in this study are based on cancer risk because these offered the most protective values (i.e. the lowest corresponding concentrations) for the subject chemicals. For each chemical, the Committee chose a screening value that corresponds to an increased cancer risk of one in one million under the assumed conditions of exposure. This is consistent with risk management goals used by various EPA programs, including the ambient air program. For pollutants that may cause cancer, EPA programs use a risk management range of one in one million to one in ten thousand under their reasonable maximum exposure scenarios to guide their decision-making. The screening values used in this analysis are not enforceable standards and were used for committee screening purposes only. Enforceable State standards are

applied to individual facilities and are based on an increased cancer risk of one in one hundred thousand outside the facility. The Committee screening values are more conservative than the State standards and cannot be directly compared. Once screening values were chosen, the Committee compared them to the measured and modeled concentrations in the Partnership neighborhoods. All neighborhood chemical air concentrations found above the screening values are identified in this report. They are discussed in question seven below.

6. What community questions can and cannot be answered with this information?

It is important to recognize that there are limitations to the information that this kind of screening analysis can provide. Most significantly, a study of this kind cannot tell the community what the actual risks from these chemicals are in each of the Partnership neighborhoods. This is true because much of the screening is based on estimates and not on actual measurements, because the actual measurements were taken only in Fairfield and not in all of the Partnership neighborhoods, and because no study was made of the people living in our neighborhoods to get a better idea of their actual exposure. This would take into consideration things like the time spent in the neighborhood, ages, time spent outdoors, etc. The Air Committee decided that collecting all the information necessary for a more detailed risk analysis would be both expensive and time consuming and may not add that much to the community's ability to set priorities. (See section Question 11 for more background on the limitations of the method used.)

Finally, the Air Committee air screening exercise does not provide sufficient information to explain current or future incidences of cancer and other diseases in the Partnership neighborhoods. There are many contributing factors affecting community health that were not considered in this study. These include things like lifestyle, diet, smoking, access to medical care, and heredity. In addition, the Air Committee looked only at current levels of chemicals, not at exposures that occurred ten or twenty years ago when ambient air pollutant emissions and ambient concentrations were higher than today's levels. Current incidences of cancer may be caused, in part, by these past exposures. It is also important to recognize that the analysis in this report is based on the assumption that reduced emissions are associated with reduced risk.

Despite the limitations, the screening analysis provides valuable information to the community. The analysis identifies and inventories all the significant commercial, industrial, and waste treatment and disposal facility sources of chemicals in outdoor air in the Partnership neighborhoods. It provides the best estimates available on the types and amounts of chemicals in outdoor air in Partnership neighborhoods, including estimates of the aggregate concentrations of the same chemical from multiple sources. The analysis compares the estimated and measured concentrations to health values and provides enough risk information to help the community set priorities and chart an effective course of action for improving air quality. It also helps to establish a community air quality baseline that can be used to evaluate future progress and identify potential concerns with new sources. The analysis also allows the Partnership to compare the levels in its neighborhoods to other urban, suburban and rural neighborhoods where the same chemicals have been measured. In sum, the Air Committee study was designed to identify aspects of air quality where prevention efforts would be most effective in contributing to improving the future health of the community. This information must be combined with a much broader effort to

address all the factors contributing to community illness to effectively address community health concerns.

7. What were the results of the evaluation?

Of the 175 chemicals analyzed in the effort, only four exceeded the Committee Screening Values. Concentrations of benzene, 1,3-butadiene, carbon tetrachloride, and methyl chloride measured at the monitoring station were found to exceed the Committee screening values. The benzene level in Wagner's Point modeled from the emissions from area industries and other facilities was also above the Committee screening value. All other measured concentrations and concentrations modeled in Partnership neighborhoods were found to be below the Committee screening values. Except for the benzene level in Wagner's Point, the emissions from all the industries and other facilities in and around the Partnership neighborhoods resulted in modeled concentrations that were below the committee screening values. Vehicles and other mobile sources are a significant source for benzene and 1,3-butadiene. Carbon tetrachloride is primarily due to past uses (ToxFAQs,Sept.1995); methyl chloride concentrations are primarily due to past uses and natural sources (OAQPS,,Dec.1994). Additional details on the sources and other information on each of the four chemicals found to be above committee screening levels are given below:

As explained in Question 5 above, the Air Committee chose a screening value that corresponds to an increased cancer risk of one in one million under the assumed conditions of exposure. The total risk level for the four chemicals found to be above the Air Committee screening value correspond to an increased cancer risk of 6 in one hundred thousand. While this risk estimation is not a characterization of actual health risks, it can provide a relative indication of the potential health concerns associated with these chemicals. EPA programs use a risk management range of one in one million to one in ten thousand under their reasonable maximum exposure scenarios to guide their decision-making for carcinogens.

Benzene: The Committee determined that most of the benzene in outdoor air originates from cars and other mobile sources. Other sources of benzene in Partnership neighborhoods include a chemical plant in Fairfield, petroleum product terminals, and gas stations. Except for the Wagner's Point neighborhood, the modeled benzene concentrations from the industrial and commercial facilities were below committee screening levels. In Wagner's Point, mobile sources and bulk petroleum facilities account for most of the benzene. Benzene exposure can cause a distinct form of leukemia, known as acute myelogenous leukemia, and is classified by the EPA as a known human carcinogen (Group A). For more details on the health effects of benzene, see the attached fact sheet (ToxFAQs, Apr.1993).

1,3-Butadiene: In the Baltimore area, this chemical is emitted almost entirely by cars and other mobile sources. At the time of the analysis, 1,3-butadiene is classified as a probable human carcinogen by the U.S. EPA (Group B2; data in humans exist but are considered inadequate alone; data from rat and mouse studies are sufficient to indicate a carcinogenic potential in humans). For more details on the health effects of 1,3-butadiene, see the attached fact sheet (ToxFAQs, Sept.1995).

Carbon Tetrachloride: Monitored levels at Fairfield are due almost entirely to past emissions of this chemical which is now being phased out of use due to its effects on the earth's stratospheric ozone layer. Levels found at Fairfield are typical of urban areas where it has been measured. Long term exposure to carbon tetrachloride can produce liver and kidney damage. Carbon tetrachloride has been classified by the EPA as a probable human carcinogen (Group B2; data in humans exist but are considered inadequate alone; data from rat, mouse and hamster studies are sufficient to indicate a carcinogenic potential in humans) For more details on the health effects of carbon tetrachloride, see the attached fact sheet (ToxFAQs, Sept.1995).

Methyl Chloride: Also known as chloromethane, monitored levels in Fairfield are primarily the result of natural processes in the environment. Methyl chloride is present in air all over the world. Levels at Fairfield are similar to levels in other U.S. cities where air monitoring for methyl chloride has occurred. Long-term exposure to methyl chloride may produce liver, kidney, spleen and brain damage. Methyl chloride has been classified by the EPA as a possible human carcinogen (Group C), but has not been associated with any particular form of cancer in humans. For more details on the health effects of methyl chloride, see the attached fact sheet (OAQPS,Dec. 1994).

8. How does outdoor air quality in Partnership neighborhoods compare with other Baltimore locations and with other urban communities?

Benzene, 1,3-butadiene, carbon tetrachloride and methyl chloride are regional air pollutants and have been measured by MDE at six monitoring locations within the Baltimore region. The bar charts in Figures 1 through 4 on page 8 compare the concentration levels for each of the chemicals at the six monitoring locations. The Air Committee screening levels for the chemicals are also shown on the bar charts. Data from these locations are intended for use in an overall characterization of these chemicals in the broader Baltimore area rather than to support detailed assessment of specific neighborhoods. Interpretation of data from individual sites is complicated by differences in meteorological conditions that can affect readings as well as by siting that may have been chosen to complement other monitoring sites.

As illustrated in these bar charts, levels of 1,3-butadiene measured at Fairfield are the second lowest of the six locations. The levels of benzene, carbon tetrachloride, and methyl chloride measured at Fairfield are higher than those measured at the other locations. Given the small difference in the concentration levels measured at the different monitoring stations and given the uncertainties in the risk calculations, the risk levels associated with the measured concentrations at the six monitoring stations are too close to differentiate. In other words, the risks of the four chemicals may be essentially the same throughout the Baltimore area.

The committee also compared the level of these chemicals to levels in other cities where similar measurements were made. Measured levels in these cities are similar to Baltimore levels. Levels of carbon tetrachloride and methyl chloride in Baltimore were below the levels estimated for cities in the Agency for Toxic Substances and Disease Registry fact sheets for these chemicals. See Table 1 on page 9 for details of these comparisons.

9. Is air pollution in Partnership neighborhoods getting better or worse?

Emission and monitoring reports reviewed by the Committee demonstrate that air quality in Partnership neighborhoods and the surrounding region has been improving for several years (Maryland Department of Environment 1992-1996; USEPA, Dec. 10, 1996). This improvement is true for dozens of toxic chemicals as well as for common air pollutants for which there are national ambient standards. Information reviewed included emission reports submitted to the state and to EPA and air monitoring reports prepared by the state.

10. What can we do if we want to improve our air quality?

There are several ways that community members can work to improve air quality. First, the Partnership Air Committee would like to continue its work to learn more about the other parts of our air that are not included in this report. One of the Committee recommendations listed below calls for more work on odors, truck exhaust and truck routing. Volunteers are needed to work on these areas. Also, it is possible to address the emissions of the four chemicals identified in this report. Since most of these emissions are associated with mobile sources, that means getting involved in the national debate on controlling vehicle emissions. EPA is now working on these issues and community input will be crucial to the decisions made. The Partnership Air Committee plans to invite representatives from EPA and MDE to speak to the committee and then the committee will develop a plan to make the community's voice heard on these issues. The Committee also recommends further work with the local companies that are contributing to the levels of benzene in our air and to help them find ways to further reduce their emissions. Committee volunteers are needed to work on this as well.

11. What are the limits of the analysis used?

The committee utilized a conservative (i.e. one that is designed to overestimate concentrations and risks) screening method to reach these results. The resulting risk calculations do not correspond to actual exposure scenarios nor do they represent estimates of risk to actual persons. The analysis simply provides a systematic approach and a common standard to compare the relative importance of the measured or modeled chemical concentrations.

It is important to point out key limitations of the study that are due in part to the current state of the science used. 1) The study addresses only cancer risks to a hypothetical adult population resulting from inhalation exposure to specific individual chemicals. The study does not address other routes of exposure or possible toxicologic interactions among the multiple chemicals to which people are exposed. 2) The study does not specifically address sensitive segments of the population such as children. 3) The screening values used by the Committee were based on cancer effects. Because of incomplete information on the potential toxic effects of some chemicals, there may be other health effects, such as birth defects and endocrine disruption, that could lead to lower screening levels. Significant scientific uncertainty and controversy exists around the issue of very low dose effects for endpoints like endocrine disruption. Please see section 6 for additional explanation of the limits of the study.

12. What does the air quality committee recommend?

The Committee believes that the community should encourage the continual reduction of emissions, especially through pollution prevention measures. In addition, the Committee has proposed four recommendations. Community volunteers are needed to work on these recommendations.

1) Work with local facilities to reduce benzene emissions especially through more pollution prevention

2) Encourage appropriate actions to reduce odors. See attached page with results of the Committee Odor Survey listing known sources of odors in community

3) Encourage appropriate action to reduce diesel truck exhaust through means such as the enforcement of current truck traffic restrictions, better diesel motor maintenance for vehicles regularly using local roads, and the rerouting of truck traffic. See attached page with listing of diesel vehicles regularly using Partnership streets.

4) Develop ways to educate the community about the impacts of indoor air pollution

13. What else is being done to improve air quality?

On the local level, additional monitoring and air sampling work to get more accurate information on exposures is now underway. These measurements should add more information to the community's understanding of local air quality. The Partnership should continue to review data from MDE and any other local agencies with pertinent air quality information.

On the national level, EPA has proposed an ambitious new schedule for addressing risks from air toxics in urban areas that would, among other things, set new standards for dozens of categories of small, stationary sources not targeted under the agency's existing air toxics program. Under the strategy,"area" sources, such as institutional and commercial boilers, municipal landfills, paint stripping operations, and sewage treatment works, would face new requirements for cutting air toxics by 2009, with some rules taking effect as early as 2005 (USEPA,1999). The plan also calls on the agency to assess emission reductions from mobile sources and determine whether additional regulations are needed to cut air emissions from these sources. The agency is working to finalize these rules.

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ToxFAQs. September 1995. Carbon Tetrachloride. Agency for Toxic Substances and Disease Registry , U.S. Dept. of Health and Human Services, Public Health Service, Division of Toxicology, Atlanta, GA., 30333.

USEPA. July 19, 1999. National Air Toxics Program: The Integrated Urban Strategy; Federal Register Volume 64, No. 137,

USEPA, OPPT. Dec. 10, 1996. TRI Indicators Report prepared by Steve Hassur: "Preliminary Analysis for the Baltimore Community Environmental Partnership Air Working Group

1996 Annual Average vs Screening Levels for Priority Chemicals

Figure 1. 1,3-Butadiene Monitored Concentration VS Screening Level Concentration

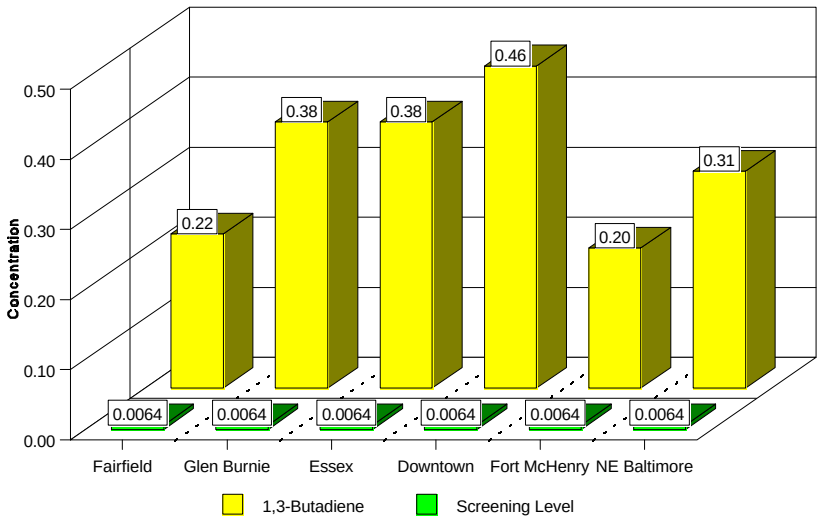


Figure 2. Benzene Monitored Concentration VS Screening Level Concentration

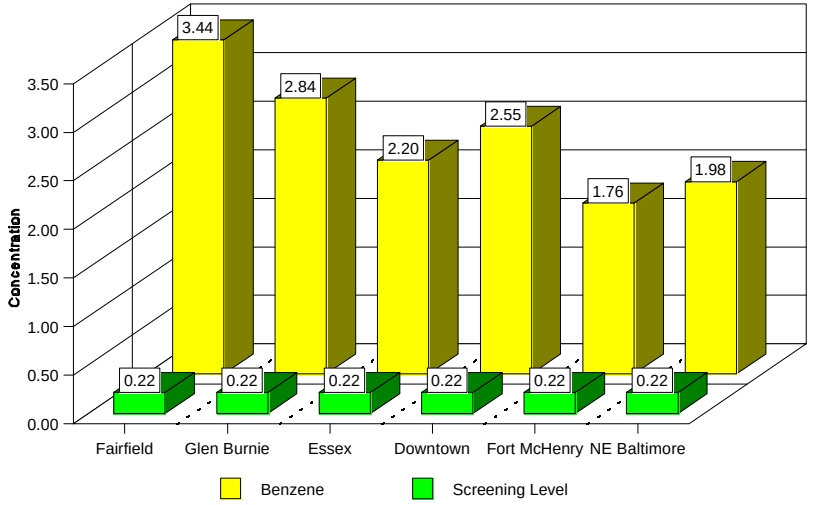


Figure 3. Carbon Tetrachloride Monitored Concentration VS Screening Level Concentration

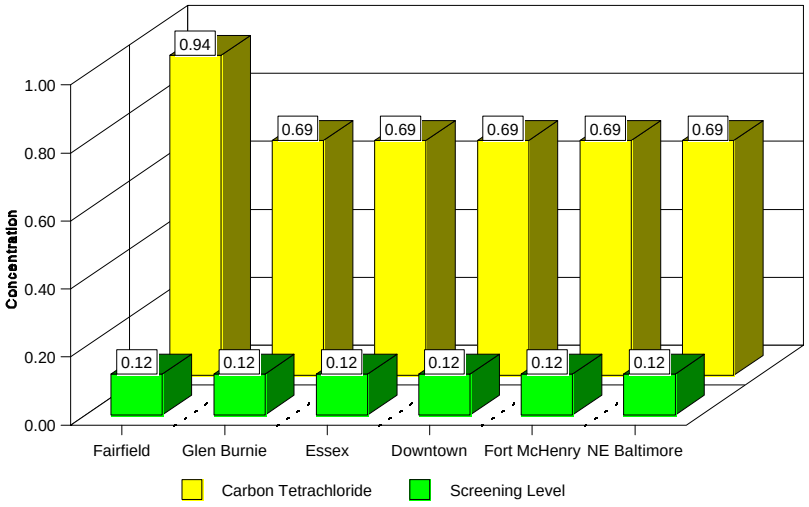


Figure 4. Methyl Chloride Monitored Concentration VS Screening Level Concentration

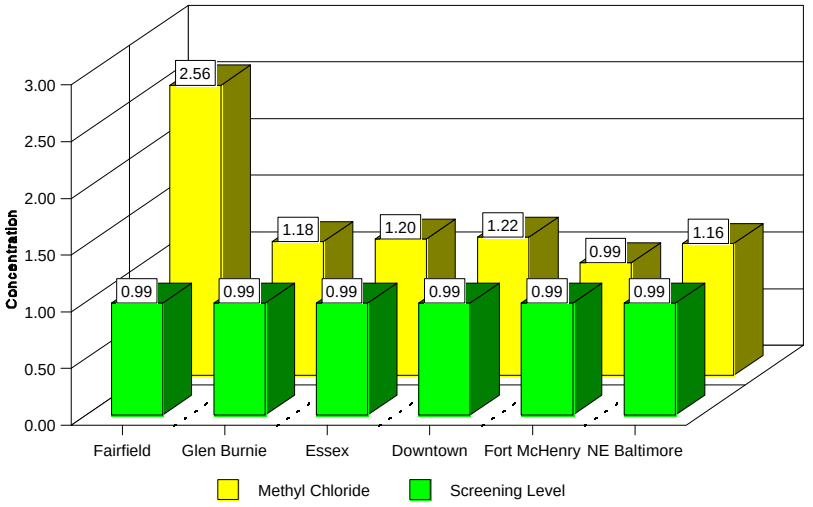


TABLE J-1
AVAILABLE MONITORING DATA
Annual Average Concentrations in ug/m^3

	Baltimore	Fremont, CA	Fresno, CA	Los Angeles	ATSDR	Louisiana	NYAir Toxics	Texas Air Toxics
Benzene	3.4	4.1	4.5	7.3	NA	3.8	2.67	1.9
Carbon Tetrachloride	0.94	0.48	0.49	0.50	0.63 background 1.3 - 3.8 in cities	1.0	1.1	0.57
1,3 Butadiene	0.22	0.34	0.43	1.04	NA	NA	NA	0.91
Methyl Chloride	2.5	NA	NA	NA	2.1 background 6.2 in cities	1.31	NA	NA

APPENDIX K

Baltimore Air Dispersion Modeling

Baltimore CEP Short Term Air Modeling- Summary of Model Set-up and Assumptions Used.

The Industrial Source Complex Short Term (ISCST3) model was run for five different scenarios. The manner in which the model was set up and the assumptions used were similar for each scenario. In general the changes between scenarios were limited to differences in the number of sources modeled, the type of pollutants modeled, pollutant emission rates, and modeling averaging times. Discussed first below, is the basic model setup and assumptions used common to all five scenarios. This is followed by individual discussions of the unique aspects for each of the five scenarios.

Model Setup and Assumptions Used (All Scenarios)

Both toxic and criteria air pollutants were modeled over five separate years (1987,1988,1990,1991,1992) or a subset of those years. All facilities were located in the southeast portion of the Baltimore Metropolitan area. Receptors locations were the same for all scenarios.

The following lists the model configuration/set-up used.

- Urban dispersion mode
- Flat, simple terrain
- No wet or dry plume depletion and no wet scavenging
- Regulatory default options used
- Assumed sea-level for all source base elevation heights
- Assumed sea-level for all receptors elevations (model assumes all receptors on flat terrain).
- No source grouping
- Calculate average concentrations only, no deposition
- Four discrete receptors*
- Fine cartesian grid with 250m grid spacing (700 receptors)**
- Coarse cartesian grid with 2000m grid spacing (72 receptors)**
- Hourly emission rate assumed to be annual rate divided by 8760 hours per year
- Assume no flagpole receptor heights
- No building downwash
- Surface weather data from Baltimore-Washington International
- Upper air weather data from Sterling VA.

		Latitude	Longitude
* Location of discrete receptors:	Cherry Hill.....	39.2484	76.6237
(decimal deg.)	Brooklyn.....	39.2332	76.6040
	Wagners Point.....	39.2303	76.5689
	Curtis Bay.....	39.2250	76.5903

	Latitude	Longitude		Latitude	Longitude
** Corners for coarse grid:	39 17 27.3	76 39 20.5	** Corners for fine grid:	39 15 09.2	76 37 50.1
(deg min sec)	39 17 36.2	76 28 12.9	(deg min sec)	39 15 12.7	76 33 39.8
	39 09 53.3	76 39 09.9		39 11 30.3	76 37 45.0
	39 10 02.2	76 28 03.4		39 11 33.8	76 33 35.0

Note: The layout of the grid is depicted (with sources locations) in Figure 1 in Source Data Summary and Assumptions.

Source Data Summary and Assumptions

Twenty nine pollutants were modeled, from a total of 36 sources. Table K-1 lists all sources and their location. Note, as will be discussed later, pollutants modeled differed by source and by each of the five scenarios.

Table K-1. List of Sources Modeled and their Location

Source Name	Latitude	Longitude
Amerada Hess	39.209800	76.584898
Amoco Oil Co.	39.211600	76.584394
Amoco Station (Patapsco Ave)	39.238700	76.611800
Amoco Station (Ritchie Hyw)	39.219800	76.614700
Baltimore Resco	39.270803	76.630401
BGE- Brandon Shores	39.189101	76.534601
BGE- Wagner Station	39.178500	76.527401
TOSCO (Bayway Terminal) (BP)	39.229996	76.572702
Bethlehem Steel	39.219000	76.476594
Chemetals Corp.	39.194901	76.564601
CONDEA-Vista Chem.	39.235796	76.578195
FMC Agricultural Chemical	39.231695	76.581602
Grace Davison	39.209298	76.569402
Hobelmann Port Services	39.238796	76.571600
J.S. Lee's Body Shop, Inc.	39.217502	76.642904
Valley Proteins	39.214600	76.588500
Delta Chemical	39.230600	76.566700
Crown Station (Ritchie Hyw)	39.217400	76.614400
Crown Station (Potee St)	39.239400	76.611200
Baltimore City Composting	39.205700	76.560100
Brooklyn Service Center	39.234800	76.597600
Citgo Station	39.216800	76.615200
Shell Station	39.218400	76.614700
U.S. Coast Guard	39.204000	76.569700
MOTIVA (Mobil Oil) (Maritank)	39.235503	76.577899
Med Net/MedX Inc.	39.208804	76.569994
Norris Farm Landfill	39.288102	76.481500
Phoenix Services	39.202197	76.557398
Pori International	39.289599	76.507399
Quebecor Printing	39.171003	76.632399
SCM Chem.- Millennium	39.206098	76.545903
MOTIVA (Shell Oil Terminal)	39.233803	76.567701
CITCO (Star Enterprises)	39.230001	76.568995
Stratus Petroleum	39.241303	76.576094
U.S. Gypsum	39.204002	76.561201

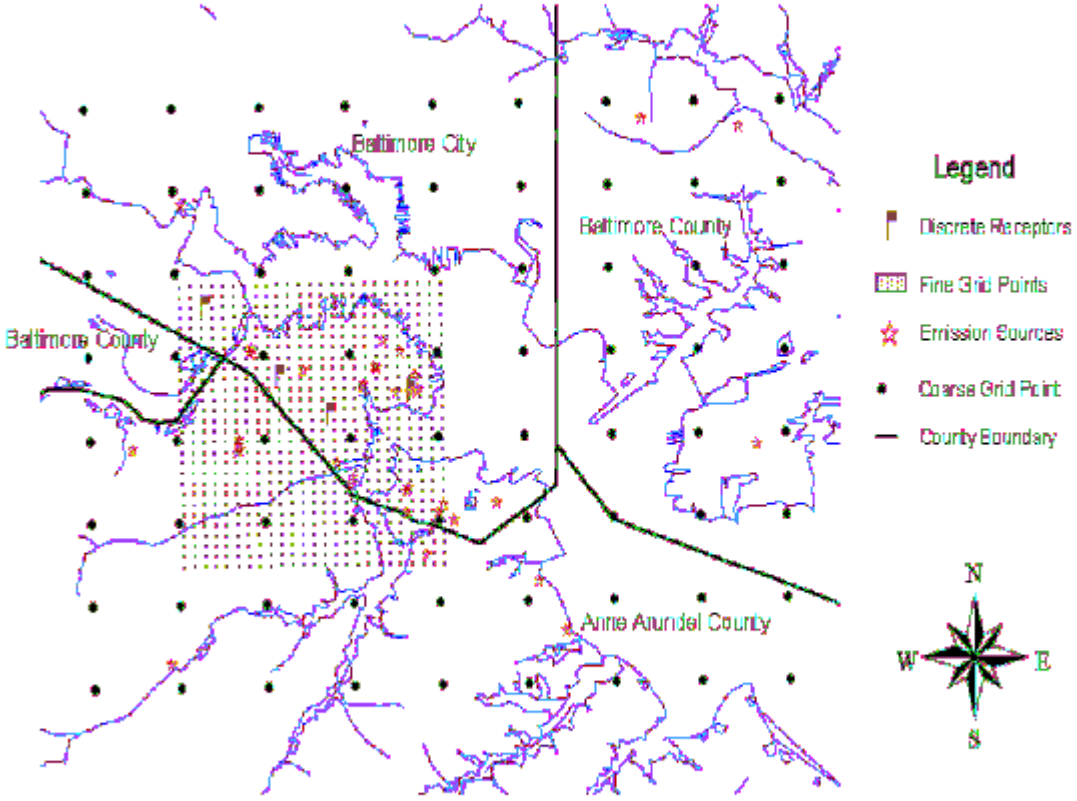
The location of all sources listed and receptors are shown in Figure 1. For many of the sources there was limited information available about the characteristics/nature of the air emission release. As a result a number of assumptions were used. The following briefly outlines any key characteristics of each source and briefly describes how each souse was modeled, included any assumptions used.

- **Amoco Oil:** Twenty identical stacks and one fugitive source. All pollutants modeled out of one stack.
- **Baltimore City Composting:** Stack parameters given for a composting reactor, and area source parameters given for a composting area. There was no breakdown of emissions between these two sources. Characteristics of the composting reactor stack (low exit velocity, low stack height, ambient air exit temperature and large stack diameter) seem to indicate that the stack may actually be a ceiling exhaust fan(s). Assumed all emissions from the composting area, with a release height of 3 meters.
- **Baltimore Resco:** Straightforward to model. One stack- all pollutants modeled out of this stack..
- **Bethlehem Steel:** Complicated source- several stacks and fugitive sources listed. For several pollutants no information was provided on the breakdown of emissions between the fugitive sources and the stack sources. For modeling purposes assumed all emissions to be from the BOF scrubber stack.
- **BGE Brandon Shores:** Source consists of two identical boilers and two similar stacks. Modeled all pollutants out of one stack.
- **BGE Wagner:** Source consists of four utility boilers and four separate stacks. Three stacks are similar, one stack has a significantly higher exhaust temperature. Pollutants were modeled out of one stack which best represented the three similar stacks.
- **TOSCO (BP Terminal) (Bayway Terminal):** One stack and five fugitive sources. Modeled as a point source.
- **Brooklyn Service Center (Patapsco Citgo):** No stacks, modeled as an area source.
- **Chemetals Corp:** 15 identical stacks- modeled out of one stack.
- **Citgo Station:** No stacks- modeled as an area source.
- **CONDEA Vista Chemical Company:** Boiler and process line emissions indicated. Assumed all pollutants except NO2 and SO2 are emitted from the process line only. Thus both the process line and boiler stack data provided were used to model the source.
- **FMC Agricultural:** Hazardous waste incinerator- modeled as a point source.
- **Grace Davison:** One stack- modeled as a point source.
- **Hobleman Port Services:** One stack- modeled as a point source.
- **J.S. Lee's Body Shop:** One stack- modeled as a point source.
- **Med Net/Medx Inc:** Medical waste incinerator (one stack)- modeled as a point source
- **Mobile Oil Co. Terminal (Maritank):** Five stacks, and area source- modeled as a grouped point source.
- **Norris Farm Landfill:** Modeled as a point source since there is a stack based venting system.
- **Phoenix Services Inc.:** Incinerator (one stack)- modeled as a point source.
- **Pori International:** One stack- modeled as a point source.
- **Quebecor Printing:** Two sets of stack parameter are listed, one for solvent recovery stacks and one for ceiling fans. Temperatures are similar for each set, velocity is higher for the fans than for the stacks. This source was modeled using the solvent recovery stack only, since increased buoyancy due to higher temperature in the recovery stacks will make up for the lower velocity of the ceiling fans. This source only operates during a 4-5 mo. block each year thus, hourly emission rates used were adjusted to reflect the shorter operating period.

- **SCM Chemicals (Millennium):** Information available for only one stack- all pollutants modeled as a point through a single stack, including boiler emissions.
- **MOTIVA (Shell Oil Terminal):** One stack (no area source information)- modeled as a point source.
- **Shell Station:** Modeled as an area source.
- **U.S. Coast Guard:** No stack information, assumed toluene emissions from an area source. Estimated the size of the area source as the typical dimensions of a Coast Guard vessel (assumed painting of a ship in dry dock). For NO2 emissions used stack parameters used to represent the boiler at Valley Proteins.
- **U.S. Gypsum:** One stack- modeled as a point source.
- **Amerada Hess:** Stack listed appears to represent emissions from fuel/oil storage and loading only (stack exit temp. was 77 deg. F). This stack was used to model benzene emissions. For NO2 emissions stack parameters from Amoco Oil were used as they better represent a flare (combustion process).
- **CITCO (Star Enterprises(& Stratus Petroleum:** No stack/release parameters given. Modeled both as a point sources using average of stack parameters from other terminals (Maritank), MOTIVA, Bayway and Shell Oil).
- **$** **Amoco & Crown Stations:** No stack/release parameters given. Modeled as an area sources using the average of area source parameters given for the Shell Station, Citgo Station and the Brooklyn Service Center.
- **$** **Valley Proteins:** Six stacks listed, 4 boiler stacks and two for a cooker. Assumed all emissions (NO2) from boiler stacks. Modeled NO2 out of one stack, which represented the average of the four stacks listed. Characteristics of the four stacks were similar, thus an average was used.
- **Delta Chemical:** No stack information provided for SO2 emissions. Modeled as a point source using stack parameters from US Gypsum.

Tables showing the stack and area source parameters used for the modeling effort are given in the Appendix.

Figure 1. Model Setup- Location of Sources and Receptors



Scenario One (Sept 97)

Twenty eight pollutants were modeled from a total of 22 facilities. The averaging periods used were annual and 24 hours. Table K-2a, shown below lists by facility the pollutants modeled and the corresponding annual emission rates used.

Table K-2a. Baltimore Facilities and Pollutants Modeled– Scenario One

Facility Name	Pollutant Name	Emission Rate (lb/yr)
Amoco Oil Co.	Toluene	9,746
	Benzene	4,000
Baltimore City Composting	Ammonia	206,660
	Benzene	7,156*
	Carbon tetrachloride	2,820
	Toluene	8,436
	Vinyl chloride	5,720
Baltimore Resco	Arsenic	630
	Cadmium	703
	Chromium	3,333
	Formaldehyde	4,355
	Hydrogen chloride	6,126,000
	Hydrogen fluoride	77,651
	Mercury	15,837
Bethlehem Steel	Cadmium	551
	Chromium	848
	Lead	958
	Manganese	20,124
BGE- Brandon Shores	Carbon monoxide	2,114,980
	Nitrogen oxides	45,987,400
	Sulfur oxides	93,865,380
	Arsenic	1,443
	Cadmium	178
	Chromium	909
	Lead	1,468
	Mercury	290
	Nickel	978
	Hydrogen Chloride	4,200,000
	Hydrogen Fluoride	5,200,000
	Dioxins and Furans	0.0062
BGE- Wagner Station	Carbon monoxide	816,140
	Nitrogen oxides	27,567,540
	Sulfur oxides	35,993,240
	Arsenic	462
	Cadmium	64

Facility Name	Pollutant Name	Emission Rate (lb/yr)
BGE- Wagner Station (cont.)	Chromium	294
	Lead	477
	Mercury	91
	Nickel	2,167
	Hydrogen Chloride	1,300,000
	Hydrogen Fluoride	160,000
	Dioxins and Furans	0.0019
TOSCO (Bayway Terminal((BP))	Benzene	1,120
Brooklyn Service Station	Toluene	141
Chemetals Corp.	Ammonia	59,568
	Hydrochloric acid	23,172
	Manganese	61,661
	Sulfuric acid	3,621
Citgo Station	Benzene	122
	Toluene	186
CONDEA-Vista Chem.	Benzene	3,000
	Hydrochloric acid	21,000
FMC Agricultural Chemical	Carbon tetrachloride	1,787
	Chloromethane	4,678
	Hydrochloric acid	707,808
	Toluene	15,628
Grace Davison	Ammonia	290,000
	Chromium	122
	Molybdenum trioxide	1,180
	Nitrogen oxides (NOx)	237,780
	Sulfuric acid	3,000
Hobelmann Port Ser.	Stoddard solvent	30,380
J.S. Lee's Body Shop, Inc.	Toluene	263
Med Net/MedX Inc.	Dioxins & Furans	0.00000199
	Hydrochloric acid	42,300
MOTIVA (Mobil Oil) (Maritank)	Benzene	882
	Toluene	5,291
Norris Farm Landfill	1,2-Dichloropropane	2,365
	Benzene	1,051
	Methyl chloride	2,365
	Methylene chloride	11,388
	Vinyl chloride	2,628
Phoenix Services	Dioxins & Furans	0.00282
	Hydrochloric acid	91,016
Pori International	Hydrogen sulfide	2,640
Quebecor Printing	Toluene	3,250,000
SCM Chem.- Millennium	Carbon monoxide (CO)	19,028,940
	Carbonyl sulfide	1,562,400

Facility Name	Pollutant Name	Emission Rate (lb/yr)
Millennium (cont.)	Sulfur oxides (SOx)	2,306,640
	Sulfuric acid	39,900
MOTIVA (Shell Oil Terminal)	Benzene	1,400
	Xylenes (m-,o-,p-)	1,500
Shell Station	Benzene	130
	Toluene	199
U.S. Coast Guard	Toluene	8,054
U.S. Gypsun	Chromium	26.2

* This number was determined to be erroneous. However, the emissions did not impact the Partnership neighborhoods.

Scenario Two (Oct 97)

Four pollutants were modeled from a total of twelve facilities. The averaging periods used were annual, 24 hours and 8 hours. Table K-2b, shown below lists by facility the pollutants modeled and the corresponding annual emission rates used.

Table K-2b. Baltimore Facilities and Pollutants Modeled– Scenario Two

Facility Name	Pollutant Name	Emission Rate (lb/yr)
Baltimore Resco	Chromium	70
	Hydrogen chloride	6,126,000
Bethlehem Steel	Chromium	848
	Manganese	20,124
BGE- Brandon Shores	Chromium	909
	Hydrogen Chloride	4,200,000
BGE- Wagner Station	Chromium	294
	Hydrogen Chloride	1,300,000
Chemetals Corp.	Hydrochloric acid	8,901
	Manganese	16,707
CONDEA-Vista Chem	Hydrochloric acid	12,000
FMC Agricultural Chemical	Hydrochloric acid	2,600
	Methyl chloride	150
Grace Davison	Chromium	122
Med Net/MedX Inc.	Hydrochloric acid	6,250
Norris Farm Landfill	Methyl chloride	130
Phoenix Services	Hydrochloric acid	6,952
U.S. Gypsum	Chromium	26.2

Scenario Three (Jan 98)

Three pollutants (benzene and speciated chromium - Cr+3 and Cr+6) were modeled from a total of twenty two facilities. The averaging periods used were annual, 24 hours and 8 hours. Table K-2c, shown below lists by facility the pollutants modeled and the corresponding annual emission rates used.

Table K-2c. Baltimore Facilities and Pollutants Modeled– Scenario Three

Facility Name	Pollutant Name	Emission Rate (lb/yr)
Amoco Oil Co.	Benzene	80
Baltimore City Composting	Benzene	7,156*
Baltimore Resco	Cr+3	67
	Cr+6	3
Bethlehem Steel	Cr+3	847.152
	Cr+6	0.848
BGE- Brandon Shores	Cr+3	633
	Cr+6	276
BGE- Wagner Station	Cr+3	204
	Cr+6	90
US Gypsum	Cr+3	25.999974
	Cr+6	2.6e-5
Grace Davison	Cr+3	122
TOSCO (Bayway Terminal) (BP)	Benzene	220
Citgo Station	Benzene	61
CONDEA-Vista Chem.	Benzene	2,200
Amoco Station (Ritchie Hwy)	Benzene	67
Amoco Station (Patapsco Ave)	Benzene	66
Crown Station (Ritchie Hwy)	Benzene	62
Crown Station (Potee St)	Benzene	44
MOTIVA (Mobil Oil) (Maritank)	Benzene	1,440
Norris Farm Landfill	Benzene	16
Star Enterprises	Benzene	348
Stratus Petroleum	Benzene	880
MOTIVA (Shell Oil Terminal	Benzene	480
Shell Station	Benzene	65
Amerada Hess	Benzene	652

* This number was determined to be erroneous. However, the emissions did not impact the Partnership neighborhoods.

Scenario Four (Jan 98)

Benzene was modeled using the facilities and emission rates listed in Table K-2c. Each facility was modeled separately for 1990 and 1991 only. This was done to determine each facilities contribution to the average annual benzene concentration at Wagners Point in 1990 and at the receptor with the highest overall concentration in 1991. Note, the 1990 average annual benzene concentration at Wagners Point and the 1991 highest receptor concentration were the highest overall values calculated for all years modeled in Scenario 3.

APPENDIX L

Peer Review Comments and Response

Peer Review Comments and Response

This appendix presents the results of the peer review of the November 5, 1999, draft of *Air Committee Technical Report - Risk-Based Air Screening: A Case Study in Baltimore, MD* (the Baltimore Case Study report). The materials presented summarize the main issues raised by the six peer reviewers and the subsequent activities initiated by EPA and the Baltimore Air Committee to respond to and revise the document. This appendix includes a brief overview of the scope and purpose of the peer review, the charge given to the peer reviewers, a list of the peer reviewers, copies of their complete comments, and the responses to comments. The comments and responses are organized into three major categories: (1) main issues raised in the peer review, (2) suggestions for improvements to the risk screening methodology that will be prioritized for future implementation, and (3) suggestions for clarifying the Case Study report.

Scope of Peer Review

The peer review of the draft document *Air Committee Technical Report - Risk-Based Air Screening: A Case Study in Baltimore, MD* was conducted to evaluate the technical procedures used in the risk screening process in Baltimore. Technical experts from the Federal government, academia, and industry were identified and asked to review the Case Study document and the methodology used. Although the review focused primarily on the risk screening steps that were developed in the course of the Baltimore study, the peer reviewers were also asked to evaluate the methodology (emissions inventory, initial screen, secondary screen, final screen) and the stakeholder participation process and provide comments on potential improvements. The charge to the peer reviewers is presented on page L-19.

Background

EPA requires that all major scientific and technical products developed for use in decision making undergo peer review. The policy applies to both internal and external products that support research, regulatory, or other Agency decisions. The *Peer Review Handbook* (U.S. EPA, 1998), published under the auspices of the Science Policy Council (SPC), provides Agency-wide guidance on the process for conducting peer reviews.

> *The goal of the Peer Review Policy and this Handbook is to enhance the quality and credibility of Agency decisions by ensuring that the scientific and technical work products underlying these decisions receive appropriate levels of peer review by independent scientific and technical experts.*
>
> *Peer review is intended to uncover any technical problems or unresolved issues in a preliminary (or draft) work product through the use of independent experts. This information is then used to revise that draft product so that the final work product will reflect sound technical information and analyses. Peer review is a process for enhancing a scientific or technical work product so that the decision or position taken by the Agency, based on that product, has a sound, credible basis* (U.S. EPA, 1998).

Selection of Peer Reviewers

Candidate experts were identified and selected to conduct the peer review on the basis of their expertise in the topic areas covered in the document (air quality assessment, emissions modeling, and risk screening/assessment, etc.). These experts were selected in a manner that ensured objectivity; the peer reviewers were independent and had no actual or perceived conflict of interests. Six experts, selected from a wide range of organizations including academia, consulting firms, industry, and government organizations, are listed below:

Michael A. Callahan
U.S. EPA National Center for Environmental Assessment

Gail Charnley, Ph.D.
HealthRisk Strategies

Douglas Crawford-Brown, Ph.D.
Department of Environmental Science and Engineering
University of North Carolina at Chapel Hill

Amy D. Kyle, Ph.D.
School of Public Health
University of California, Berkeley

Kenneth L. Mitchell, Ph.D.
U.S. EPA Region 4

Ronald E. Wyzga, Sc.D.
Electric Power Research Institute

Peer Review Comments

The full written comments from the six peer reviewers are attached at the end of this appendix.

Response and Reconciliation

The responses to the comments received on the Baltimore Case Study report are organized into three major categories: (1) main issues raised in the peer review, (2) suggestions for improvements to the risk screening methodology that will be prioritized for future implementation, and (3) suggestions for clarifying the Case Study report.

1. Main Issues Raised by the Peer Reviewers

In summarizing the peer review comments, EPA and the Baltimore Air Committee identified seven issues to address. These issues were selected because they raise important questions about the Baltimore air screening exercise and its conclusions. A statement of the seven issues and EPA's responses follow:

Issue 1.1 Two reviewers pointed out that confidence in the ability of the screening process to identify all chemicals of concern needs to be better demonstrated in the report. As pointed out by the reviewers, if the screening process is valid, the screening concentrations should decrease or remain the same as chemicals proceed through the screening. Each subsequent step in the screening process uses better information to more accurately characterize the concentrations. Reviewers suggested that the report should explicitly illustrate the decrease in the concentrations of the chemicals at each step to build confidence in the screening process. Conversely, if the use of better information results in higher concentrations, then the earlier steps of the screening process may not be designed to be sufficiently protective and the confidence in the screening may be misplaced. If the concentrations go up with the chemicals selected for review, then concentrations for chemicals eliminated might also be higher with better information. The concentrations may, in fact, go above the screening levels and consequently, the process may eliminate chemicals that may be of concern. Reviewers point out that, in fact, concentrations for one of the selected chemicals, benzene, increased in the final step of the process. This higher concentration needs to be explained or the validity of the process will be in question.

Response It is agreed that there is a need to better demonstrate the validity of the screening by demonstrating the decrease in concentrations as one advances to later stages of the methodology. While this is generally true, and could be shown with the examples of chromium, hydrochloric acid, and manganese, the increase in estimated benzene concentrations from the secondary to the final screen raises questions. The means by which the validity of the methodology will be demonstrated will be clarified in the "How To" manual.

The final screen for benzene resulted in the discovery of additional sources of emissions or increased annual benzene emissions over those used in the secondary screen in the Wagner's Point area near the modeled receptor location. These increases in emissions account for the increase in modeled airborne concentrations between the secondary and final screens. This reflects an error of omission in the construction of the emissions inventory that was discovered when a closer examination of the facilities emitting the chemical was conducted. Had the facilities and their correct annual emissions been identified in the initial inventory steps, no increases in benzene concentrations between secondary and final steps would have been observed.

The results for benzene were unusual, but not unexplainable . It is unlikely that an increase in exposure from secondary to final screen would be observed unless additional sources identified were in close upwind proximity to the receptor. In the case of benzene in Wagner's Point, this condition was met because the neighborhood is in close proximity to petrochemical storage facilities all emitting benzene. The updated information resulted in increased emissions and estimated concentrations.

The sources of other chemicals eliminated by the screening process were better known, not as numerous as benzene, and could be confidently eliminated from review. For example, the release of a "specialty" chemical, i.e., a chemical with a unique use, is only going to be found in association with the specific industrial process it is used in. If the facility employing that process is captured in the emissions inventory, it is unlikely that other emissions of the "specialty" chemical will go unaccounted for. On the other hand, a commodity chemical such as benzene could be used in and released from a multitude of processes, and because a larger number of facilities could potentially be releasing the chemical, there is a greater possibility that emissions could be missed due to an incomplete inventory.

We will suggest in the How To manual that in future screening exercises it will be important for chemicals like benzene with multiple sources to pay special attention to the source inventory and to keep chemicals with widespread sources in the process until all the sources are properly characterized. The comment and the experience with benzene point to the importance of building an accurate source inventory. The confidence in the screening process depends on this accuracy.

Issue 1.2 Two reviewers raised concerns that routes other than inhalation may produce important different results for the chemicals considered. They state that ingestion can be a significant contributor to risk for many products of combustion processes, e.g., for mercury and dioxin. Concerns were raised that the cumulative assessment could easily show that some chemicals excluded at the lower screens should have been carried forward into the higher screens if this route of exposure had been considered.

Response The focus of this investigation, as designed by the community, was on local industrial, commercial, and waste treatment and disposal sources. It was the judgement of the Air Committee that the most significant exposure pathway for these local sources was inhalation. Several peer reviewers commented that non-inhalation exposure pathways such as fish and beef ingestion can be significant for some of the chemicals studied. We agree, but it was the judgement of the Air Committee that the contribution of the local sources to these non-inhalation pathways was not significant and, as a result, they were not included in the study. A more comprehensive picture of community risk would certainly include these pathways. The OPPT Community Assistance Technical Team recognizes that developing a more comprehensive understanding of risk is an important issue for communities. In its goal to develop the most comprehensive screening tools possible, the team plans to make the ingestion pathway a priority item for improving and expanding the Baltimore screening methodology.

Issue 1.3 The report should have a formal variability and uncertainty analysis.

Response EPA agrees that variability and uncertainty analyses would strengthen the overall risk screening results, but such an analysis was beyond the scope of this screening-level assessment. For future community assessments, Internet citations of available uncertainty analysis methodologies will be included and can be incorporated if resources permit.

Issue 1.4 The analysis does not address the project’s goal because it does not look at aggregate risk from multiple chemicals.

Response EPA agrees with the comments that the Baltimore report does not look at the aggregate risk of all the chemicals and that analysis of aggregate risk information is of value to the community.

Because of the importance of this issue, the effort to find an effective way to estimate aggregate risk will be made a priority for future work. The Baltimore project did provide information on aggregate risk for the four chemicals that were identified in the final screen. The Air Committee report, found in Appendix J, states that the total risk level for the four chemicals found to be above the Air Committee screening value corresponds to an increased risk of 6 in 100,000.

To see if any additional review of the data might provide important information for the community, EPA reviewed the information developed by the Baltimore Air Committee and estimated the aggregate cancer risk for the 12 chemical carcinogens analyzed in the secondary screening step. Aggregate concentrations for these 12 chemicals were measured and/or estimated with air dispersion modeling for the second step of the screening process. Since the Turner calculation used in the initial screen did not calculate aggregate concentrations, it was not possible to estimate, using this approach, the aggregate risk for the chemicals in the initial step of the screening process.

The individual and aggregate risks for 12 carcinogens analyzed in the secondary screen, as they were calculated in the Baltimore screening exercise, are included in the table below. The last column provides the best estimate for the total aggregate risk from the 12 chemicals. The second column displays the estimated risk for the four chemicals that were identified as community priorities in the final step of the screening process. As displayed in the table, the addition of all the chemicals adds a risk of about 3 in 1,000,000 to the aggregate risk of 6 in 100,000 for the chemicals identified in the final screen. Please note that the risk estimates for the chemicals at the secondary screening level are based on maximum permitted emission rates and not on the best available information used in the final step of the screening process. Please see a fuller description of the limits of these risk screening estimations in the Air Committee Report, Appendix J.

Aggregate Cancer Risk Estimates

Pollutant Name	Risk Based on Modeled Conc.	Risk Based on Monitored Conc.	Best Estimate
Arsenic	3.55E-007	0.00E+000	3.55E-007
Benzene	1.75E-006	1.44E-005	1.44E-005
Butadiene, 1,3-	0.00E+000	3.60E-005	3.60E-005
Cadmium	1.48E-007	0.00E+000	1.48E-007
Carbon tetrachloride	1.70E-007	7.40E-006	7.40E-006
Chloromethane (Methyl chloride)	1.85E-008	1.17E-006	1.17E-006
Chromium +6	6.02E-008	0.00E+000	6.02E-008
Chromium +3	0.00E+000	0.00E+000	0.00E+000
Dichloropropane, 1,2-	3.00E-009	0.00E+000	3.00E-009
Methylene chloride	3.57E-010	0.00E+000	3.57E-010
Dioxins & furans (2,3,7,8-TCDD)	2.68E-008	0.00E+000	2.68E-008
Formaldehyde	5.95E-009	0.00E+000	5.95E-009
Vinyl chloride (Chloroethene)	2.64E-007	0.00E+000	2.64E-007
Aggregate Risks	**2.80E-006**	**5.90E-005**	**5.98E-005**

Issue 1.5 Reviewers make the point that the toxicity information for many chemicals is inadequate and that the toxicity information for the protection of children and infants from the effects of toxic substances is particularly inadequate. Given these inadequacies, reviewers state that it is not responsible to represent the toxicity database as sufficiently complete to allow for full assessment of the likely health significance of hazardous air pollutants, and assessments based on the current toxicity database should be represented as a likely underestimate.

Comment Toxicity data for more than 115 of the 175 chemicals were available from the two main sources used for this assessment, EPA's Integrated Risk Information System (IRIS) and Health Effects Assessment Tables (HEAST). IRIS was chosen as the primary source of toxicity information because of its availability and because of the level of scientific review of the assessments contained in IRIS. IRIS is widely recognized by the scientific community as a preferred source of chronic toxicity data for environmental risk assessments. In the absence of toxicity data for a chemical from IRIS, the secondary source for data used in the assessment was HEAST. Toxicity data available included 28 chemicals with cancer slope factors and 93 with RfDs with 57 of the 93 based on the inhalation pathway. Because of the available data, many, but not all, of the chemicals in the Baltimore inventory could be assessed as part of the screening process. A more complete literature search for toxicity data was beyond the scope of the Baltimore screening-level assessment.

EPA agrees with the reviewers' comment that the toxicity information available for the Baltimore screening was not comprehensive. The information did allow the community to address known chronic hazard concerns. EPA also agrees that the limits of the analysis resulting from the incomplete toxicity data should be made clear. Language further stressing this point has been added to the Case Study.

For future screening-level community assessments, efforts will be made to identify additional sources of toxicity information readily available to communities via the Internet or other means. An effort will also be made to make new toxicity information from expanded testing initiatives, such as the High Production Volume Challenge Program, available to communities.

Issue 1.6 Reviewers raised concerns that because measured and modeled airborne concentrations of the same chemical were different, the modeling was not accurate, and that results using estimated airborne concentrations are of questionable value. It was also suggested that monitoring must be done to verify the modeling.

Response Several reviewers raised questions about the validity of the air dispersion modeling used in the Baltimore project. While we agree with the reviewers on the need for adequate monitoring to support air dispersion modeling, we believe that modeling can provide important and valid information. In the Baltimore project, limited resources did not allow for additional monitoring. Air dispersion modeling was used to estimate concentrations in the absence of measured values obtained from monitoring. Air dispersion models are the primary tools used to simulate the chemical and physical processes in the atmosphere that affect the movement of pollutants from the source to the receptor (Turner, 1994). Such models are the most widely used techniques for estimating the impact of pollutants from point sources (U.S. EPA, 1987). Air dispersion models have been tested and validated and are widely used by EPA and State government organizations for risk assessment, regulatory, and permitting purposes. The modeling methods used are

generally considered to be applicable for assessing impacts of a source from the facility fence line out to a 50 km radius of the source being modeled (U.S. EPA, 1992).

Such models can provide information to help target air monitoring. Models can also predict the average concentrations of any released pollutants at any given location. Air monitors, on the other hand, can only measure pollutants that occur at that particular monitor. Air dispersion models can provide information concerning the concentration a pollutant is likely to reach. Air monitors can only measure the concentration on the day the monitor collects a sample Most importantly, air dispersion models provide information needed for risk management (for example, indicate what facility released a particular pollutant in unacceptable amounts).

In addition to general questions on the value of air dispersion modeling, several reviewers noted the discrepancy between the concentrations measured at the monitoring station located in the target area and the modeled concentrations. In several cases the measured concentrations are much higher than modeled concentrations. This led reviewers to question the accuracy of the modeling overall. The issue of the difference between the measured and modeled concentrations is discussed on page 53 of the Case Study report and illustrated for benzene in the pie chart in Figure 5 on page 55. We do not believe that the differences question the validity of the air dispersion modeling. The modeling did not include mobile sources and the Air Committee concluded that the difference between monitored and modeled concentrations could largely be explained by the contribution of mobile sources to the monitored measurements. As noted in the text, the modeling of mobile sources is strongly recommended for future air screening exercises. Although geographical areas cannot be directly compared, the recently released report summarizing a study of air quality in Southern California, the MATES-II Report, generally confirms the Air Committee conclusion on the contribution of mobile sources to the measured concentrations. In this report mobile sources are estimated to account for at least 90 percent of benzene emissions. (Draft MATES II Report of the South Coast Air Quality Management District,Reference study, November 1999. Available at http://www.aqmd.gov/news1/MATES_II_results.htm).

Turner, D. 1994. Workbook of atmospheric dispersion estimates: an introduction to dispersion modeling. Second edition. CRC Press, Inc. Boca Raton, FL.

U.S. EPA, 1987. Guideline on Air Quality Models (Revised). U.S. EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA-450/2-78-027R.

U.S. EPA, 1992. A Tiered Modeling Approach for Assessing the Risks Due to Sources of Hazardous Air Pollutants. U.S. EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA-450/4-92-001. March 1992.

Issue 1.7 With respect to cumulative target organ analysis, the section on grouping chemicals according to "similar organs or physiological systems" needs to be reconsidered because only respiratory and neurological effects were evaluated.

Response EPA agrees with the comment that the attempt to identify chemicals with cumulative effects did not follow the procedures for a hazard index calculation. The Baltimore risk screening exercise was only a limited attempt to identify chemicals acting on the same target organs, which might potentially have cumulative effects. Neither a hazard index or cumulative risk assessment was attempted. Hazard index and cumulative risk assessment require information on the mechanism of toxicity so that chemicals with the same or a similar mechanism can be grouped and the

impact of their toxicities summed. The information necessary for such an assessment was not available for this screening level assessment. The need to provide guidance on identifying chemicals with cumulative effects is included on the list of improvements for future work.

2. Suggestions for Improvements to the Risk Screening Methodology That Will be Prioritized for Future Implementation

The following comments raised issues that call for future improvements in the risk screening methodology. These comments are organized by the steps in the risk screening process and are presented in tabular form.

Suggestions for Future Improvements
SCOPING ISSUES:
Use facilitator in Partnership interaction activities (meetings, decisions, etc.)
Limit inclusion of indoor air
Look at multiple pathways of exposure
PARTNERSHIP (STEP 1):
Get agreement up front for a risk management plan
EMISSIONS INVENTORY (STEP 2)
Broaden beyond industrial, commercial, waste, especially to mobile (maybe use ASPEN) Include wastesites and landfills in source inventory
INITIAL SCREEN (STEP 3)
Improve access to toxicity data
Use recent California effort to derive acute toxicity values
Consider sensitive population analysis
Add cumulative/aggregate inhalation exposures to screening
INITIAL SCREEN (STEP 3) (continued)
Identify in advance a process for addressing issues in toxicity
Suggested method for accounting for aggregate at initial screen
Use consistent, conservative screening values throughout all screening steps (e.g., the Region 3 RBC values).
SECONDARY SCREEN (STEP 4)
Place one of the grid receptors on a school, hospital, nursing home or other sensitive population
FINAL SCREEN (STEP 5)
Expand monitoring as most important conclusion
Conduct air monitoring to validate air dispersion modeling predictions
Discuss detection limits for monitoring information used in screening
Consider persistence of chemicals in environment
Consider using 24 hour, 70 year exposure for urban populations to ambient air

3. Suggestions for Clarifying the Case Study Report

The following comments generally called for clarification in the Case Study report. In most cases the comments were determined by EPA to warrant attention and the document was revised to add the clarification needed.

Suggestion 3.1. Additional discussion is needed to explain the way the terms RfD and RfC are used in the document.

Response EPA added text on page 32 to help clarify how toxicity data were used in the initial screen. For the noncancer assessments, RfC values were converted to RfD values based on EPA-approved procedures. EPA scientists preferred to use an estimated dose and the associated RfD because risk assessors needed to evaluate risks for many types of scenarios. RfCs incorporate exposure assumptions and can only be used for one exposure scenario. By using the RfD, the same estimated doses (based on inhalation exposures) could also be used in the cancer risk calculation by combining it with the cancer slope factor. As a result, RfCs were converted to RfDs and inhalation doses were calculated for the scenario being assessed (see Region 3 RBC table in Appendix D). Conversion of RfCs to the more traditional RfDs is straightforward using a 20 m^3/day inhalation rate and a 70 kg body weight.

Suggestion 3.2 Clarification is needed on the types of air pollution sources that were included in the emissions inventory used as the basis for the risk screening. Clarification should be added to address confusion over point sources and area sources.

Response The emissions inventory for the Baltimore Case Study focused on industrial, commercial, and waste treatment and disposal sources of air pollution, ranging from small sources such as gas stations with annual emissions to air of less than 100 pounds of chemicals, to large facilities with annual emissions of over 1 million pounds. Many of these are known as point sources, such as power plants, steel mills, chemicals plants, and other large facilities. Mobile sources of air pollution, such as vehicles and small engines were not covered in the inventory. The table below (also presented on page 19 of the revised report) provides a summary of the types of sources included (and not included) in the inventory for the Baltimore Case Study.

It is also worth clarifying the use of the term "area source," which is used in two different contexts in the report. Area sources are smaller stationary sources of pollution that are not inventoried individually but whose emissions are estimated as a group and reported as a single source category for a geographic area. Examples of area sources include gas stations and dry cleaners. Another somewhat different use of the term area source applies to air dispersion modeling when the emission from a source could not be associated with an exact emission point, such as an exhaust stack. The emissions from these sources were modeled as though they were uniformly emitted from the entire area covered by the site. Within the description of the air modeling procedure, these are referred to as area sources. Care should be taken not to confuse the use of area source in the context of air dispersion modeling with the definition of area source used in defining the size of sources.

Source Inventory Table

CAA Category	Included in Baltimore Inventory	Not Included in Baltimore Inventory
Point (major stationary) Examples: chemical plants, power plants, incinerators, landfills, steel mills, POTWs	**X**	
Area (small stationary) a) Commercial and industrial chemical use and handling Examples: dry cleaners, gasoline stations, print shops	**X**	
b) Commercial, industrial, and institutional boilers Examples: school, hospital, office building heating		**X**
c) Household heating and chemical use Examples: furnaces, fireplaces, lawn chemicals		**X**
Mobile Sources a) On road Examples: cars, trucks, buses		**X**
b) Off road Examples: portable generators, construction equipment, boats, lawn mowers		**X**

Suggestion 3.3 Explain that some carcinogens have thresholds.

Response The text has been revised to more accurately represent the threshold/nonthreshold characteristic of chemical toxicity. A change to the document was made in the text box that appears on page 26 that adds: "But there are exceptions. For example, some carcinogens have thresholds."

Suggestion 3.4 Provide clarification on Figure 5 and the discrepancy between the modeled and the monitored concentrations of benzene in the Partnership area.

Response EPA has revised the report to provide additional discussion of the contribution of inventoried emission sources to the benzene concentrations monitored at the Fairfield station. The annual emissions from individual benzene sources are contained in the ISCST3 input file. Initially all benzene emissions were included in the modeling run and the maximum annual average concentration in the approximate geographic center of each neighborhood was calculated. To determine the contribution of each individual benzene

source to the total ambient air concentration in the neighborhoods, the model was run repeatedly with only one benzene source "turned on" at a time. This yielded an estimated maximum airborne concentration due to the single emissions source under consideration. That value was compared to the estimated concentration due to all sources to determine the contribution of that source (percentage of the total). Using this same approach, emission sources could be grouped together, if desired, as when many small sources are being considered.

The Partnership had both monitored and estimated annual average concentrations for benzene in one of the Partnership neighborhoods (Fairfield). A comparison of the two values was performed to determine how closely the predicted concentration matched the monitored concentration. The monitoring station in Fairfield is about ½ mile from the location of the highest predicted concentration of benzene in Wagners Point. At this distance the two locations could be unequally subject to influences, such as nearby benzene sources or differences in wind direction and frequency, that could confound the comparison of benzene concentrations. Nonetheless, if it is assumed that the modeling is accurate, then significant differences between measured benzene concentrations and modeled benzene concentrations could be due to sources of benzene not captured in the emissions inventory. The unaccounted-for emissions could be due to unregistered stationary sources or, more likely, benzene emitted from mobile sources (cars and trucks) passing through the area on high-volume routes such as I-695 and Patapsco Ave and at the I-895 toll plaza. It is well known that mobile sources make a significant contribution to benzene concentrations in urban air.

Suggestion 3.5 Clarification is needed on the methodology used for selection of the receptor locations for the ISCST3 modeling, including the geographical area considered for modeling and the receptor grids.

Response The Partnership area was defined by neighborhoods (Cherry Hill, Brooklyn/Brooklyn Park, Curtis Bay, Wagners Point) and by ZIP Codes 21225 and 21226. The coordinates of the neighborhoods corresponded with their approximate geographic centers of these towns. Page 43 of the report provides additional details on the receptor grids and the four Partnership neighborhoods used as the primary receptor locations. Recognizing that air pollutants may be transported from outside the Partnership area, facilities within 5 miles of the Partnership area were included in the emissions inventory. While this approach did not capture pollution transported from other regions of the United States, it represents an exhaustive attempt to consider local commercial and industrial stationary sources.

Suggestion 3.6 One commenter suggested that EPA should create a summary table for the 29 chemicals showing the concentrations and screening values used in each step.

Response It was determined that such a table would be very complicated and would not help the reader to interpret the outcome of the initial screen. EPA did not make the suggested change to the report because similar tables were included in Appendix I for the secondary screen, which involved fewer chemicals.

Suggestion 3.7 The document needs clarification on the sources available for toxicity data because the gaps could hinder the assessment of a chemical's human health effects.

Response The document was revised to inform the reader of the availability of toxicity data for the chemicals emitted in the Partnership area. Toxicity data for more than 115 of the 175 chemicals were available from the two main sources used for this assessment, EPA's Integrated Risk Information System (IRIS) and Health Effects Assessment Summary Tables (HEAST). These were the best readily available sources of toxicity information for this assessment. Specifically, changes on pages 28 through 30 were made to better describe the sources of toxicity data considered for the screening process. Toxicity data available included 28 chemicals with cancer slope factors and 93 that had RfDs, of which 57 were based on the inhalation pathway. This meant that many, but not all, chemicals could be assessed as part of the screening process.

IRIS was chosen as the primary source of toxicity information because of its availability and because of the level of scientific review of the assessments contained in IRIS. In the absence of toxicity data for a chemical from IRIS, the secondary source for data used in the assessment was HEAST. These are widely recognized by the scientific community as the preferred sources of toxicity data for environmental risk assessments. It is acknowledged that these sources are not comprehensive, but they do allow the community to address known hazard concerns. A more complete literature search for toxicity data was beyond the scope of this screening level assessment. The best readily available sources will also be recommended for future screening level community assessments, but efforts will be made to identify additional sources of toxicity information readily available to communities via the Internet or other means.

Suggestion 3.8 Clarification is needed on the initial screening approach and how it addresses only one source at a time.

Response The initial screen addressed emissions from individual sources because it used the Turner equation to estimate resulting air concentrations and exposures. Only in subsequent steps, where ISCST3 modeling was used, could estimates be provided for air concentrations of chemicals emitted from multiple sources.

Suggestion 3.9 The "professional judgment" that was applied for screening is not well documented and needs clarification.

Response EPA revised the document to clarify the discussion of the chemicals identified from the initial screen and the subsequent elimination of select chemicals based on professional judgment. We added text after the table on page 34 that says: Chemicals with an "*" were not selected for the next stage of the screening process because they were no longer emitted from the facility because of changes in the production process or the facility that had emitted them was no longer in operation.

Suggestion 3.10 Additional clarification is needed on the conservative nature of toxicity data, which often have many safety factors built in.

Response The document was revised on page 28 to better explain the toxicity data used in the screening and the potential for overestimating risks. For example, EPA slope factors express carcinogenic potency in terms of the estimated upper-bound incremental lifetime risk per milligram per kilogram (mg/kg) average daily dose. Cancer slope factors (CSFs) are available, where applicable, for either oral (SF_o) or inhalation (SF_i) exposures. Unit

risk is a similar measure of cancer potency for air or drinking water concentrations and is expressed as risk per microgram per cubic meter (g/m^3) in air or as risk per microgram per liter (g/L) in water for continuous lifetime exposures. The term upper bound in this context means that the measures of cancer potency are high-end estimates, so they will be conservative. This may result in an overestimate of cancer risk when toxicity data are incomplete, which is usually the case. Uncertainty and modifying factors are a few included in deriving the toxicity values, which makes the resulting toxicity values (e.g., RfDs, RfC, etc. more conservative. Upper-bound values are intended to be protective of human health for continuous lifetime exposures, even though cancer risks may be overestimated. The use of the average or lower limit values would be more likely to underestimate cancer risk.

Suggestion 3.11 Clarify the use of term "actual risk" in the report.

Response No changes were made to the document in response to this comment. In this context, use of "actual" was intended to inform the reader of the uncertain nature of risk assessments such as this, so it was important to note that these estimates could not be considered to be the "actual" risks.

Suggestion 3.12 The definition of a reference dose should be expanded to make it clearer.

Response EPA agrees with the comment and the clarification was added to the report. Specifically, the following text is now included on page 28:

A measure of toxicologic potency for chronic (long-term) effects is the "reference dose" or "reference concentration." The reference dose (RfD) is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime" and is expressed as a mg/kg-day dose (U.S. EPA, 1997e). The reference concentration (RfC) is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure of the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious noncancer effects during a lifetime. Conversion of RfCs to the more traditional RfDs is straightforward using a 20 m^3/day inhalation rate and a 70 kg body weight. RfD values for inhalation were derived from RfCs and are used in this study. The RfD is usually based on the most sensitive known effect (i.e., the effect that occurs at the lowest dose) and can exist for both oral exposures (RfD_o) or for continuous inhalation exposures (RfD_i).

Suggestion 3.13 The example source inventory database table should be modified. It carries too many significant figures for a risk assessment and the last two columns on risk and HQ should have two significant digits.

Response The purpose of this table was to provide an illustration of the database that was used for managing the data used in the screening process for the Baltimore Case Study. It is not desirable to change it in the report because the same change would have to be made in the database as well. Also, EPA recognizes that the number of significant figures is limited and that their presentation could imply a level of precision in the estimates that does not exist. For example, the aggregate risk estimates presented earlier were 5.98 per 100,000,

but EPA rounded that to 6 per 100,000 because we recognized the uncertainty in such estimates. Therefore, EPA will not change the report or database at this time, but will make the issue of the appropriate number of significant digits a future improvement issue for the database.

Suggestion 3.14 The report should be clarified to indicate that non carcinogenic screening values were also used in the risk screening.

Response EPA's risk screening methodology included both cancer and non-cancer effects (as reflected on page 29) by selecting screening levels that correspond to both types of endpoints. For the initial screen, the risk screening values of 10^{-6} for cancer and HQ > 1 for other chronic effects were used to screen individual sources. The secondary and final screens used the Region 3 RBCs as the basis for the screening levels. The RBCs are developed by EPA Region 3 scientists to reflect the concentrations at which either the cancer risk to an exposed population is 1 in a 1,000,000 or the HQ is 1. Therefore, all phases of the screening considered cancer and noncancer endpoints.

Suggestion 3.15 Incorporate the Air Committee Report into the Case Study.

Response The Air Committee Report has been revised and is presented as an appendix to the Baltimore Case Study report. EPA chose not to combine the two reports. The Air Committee Report was prepared by the Partnership and has very specific wording that was developed through a consensus-building process. EPA chose to present that report in its entirety as an appendix to the Baltimore Case Study report.

Suggestion 3.16 Add more detail, including citations, to make the document clearer and more transparent including information from the literature on similar risk screening methodologies.

Response EPA agrees and has added to the report many more citations for data and approaches used by other studies that we considered in developing the methodology. The intent is to provide the reader with information on the sources of information, particularly Internet Web sites, that were accessed to obtain information. Also, the "How to" methodology document that is being developed can be considered to be a companion piece to this report. That document will add more specifics on the types of data sources available for use in studies such as these.

Suggestion 3.17 Clarify which monitoring data were used in the screening.

Response EPA added information on page 22 about the monitoring data available for the Partnership area. 1996 annual average concentration data (the most current year available) from the Fairfield monitoring station were generally used in the screening. The use of maximum values would have probably been too conservative since they were not typical of air quality and would not have been representative of the concentrations of chemicals in the air that the neighborhood residents breathe. Data were available from 1992 to 1996 for the 41 chemicals monitored from the five Baltimore area monitoring stations (Glen Burnie, Downtown Baltimore, Fort McHenry, Essex, and Northeast Baltimore) and the one station located in the Partnership area. These data from the Fairfield monitoring station were used in the screening to represent concentrations in the Partnership area. Table I-1 in

Appendix I summarizes the monitored concentrations that were used in the screening process.

Suggestion 3.18 Clarification is needed to indicate that the predicted concentration at a grid receptor is the sum total for a chemical from all modeled sources.

Response EPA agrees and has made this clarification in the text (page 41) to reflect that the ISCST3 modeling performed in the secondary and final screens considered multiple sources that release a chemical.

Suggestion 3.19 Clarification is needed on the inhalation rate used in the calculations in the initial screen.

Response The 1 m^3/hr inhalation rate is a part of the overall Turner methodology as described in Appendix E. This is contrasted against the 20m^3/day inhalation rate used in the conversion of unit risks to cancer slope factors. The 1m^3/hr rate used in the Turner calculation is the standard method that EPA/OPPT used for previous assessments. Revising this methodology is beyond the scope of the Baltimore Case Study. This is an issue for EPA/OPPT to consider in general, and for the technical team to consider in improving the air screening methodology. For instance, the inhalation rate might be slightly revised because EPA's *Exposure Factors Handbook* reports 13.8 m^3/day as the median breathing rate, which could be used for both the Turner methodology and the unit risk factors.

Suggestion 3.20 Clarification is needed on Table 4 which indicates "NA" for a number of secondary screen emission rates while these same chemicals have values for final screen emission rates.

Response The final screen for benzene resulted in the discovery of additional emissions sources that were not part of the secondary screen. Therefore, Table 4 reflects the increased annual benzene emissions over those used in the secondary screen in the Wagners Point area near the modeled receptor location. These increases in emissions account for the increased modeled airborne concentrations of benzene in the final screen.

Suggestion 3.21 For the Fairfield monitor, the document should state whether it is a source-oriented monitor or a community-based monitor. This same comment holds for the other Baltimore area monitors mentioned in Appendix J.

Response The Fairfield monitor, as well as other toxic air pollutant monitors in the Baltimore area, are positioned so as to provide readings suitable for estimating exposure over a larger geographic area. This text change was included on page 22 of the Case Study report.

Suggestion 3.22 Appendix G should be revised for accuracy. Extraneous information that is not used in the screening process should be removed.

Response EPA reviewed the list of columns detailed in Appendix G of the Baltimore Case Study report and made them consistent with the example spreadsheet. We agree with the comment that extraneous information (i.e., not used in the screening process) should be removed. For the version of the spreadsheet that is included in the Baltimore Case Study report, some of the columns have been deleted. Similarly, the spreadsheet used to manage data for future assessments is being revised as part of the "How to" manual. We hope that

these changes will make the spreadsheet more manageable and applicable to all stages of the screening.

Suggestion 3.23 Appendix J should be enhanced to more fully describe the Clean Air Act requirements to address air toxics in urban air, including a more thorough discussion of MACT standards, the residual risk program, cleaner fuels, etc.

Response EPA did not make any changes in response to this comment because the issues are beyond the scope of this screening effort.

Suggestion 3.24 Appendix K discusses the use of 5 years of modeled data for the screening. Clarification is needed on the multiple modeling scenarios.

Response Appendix K provided background information on model set-up, assumptions and a chronology of modeling runs with ISCST3. Modeling scenario 1 in Appendix K is the modeling for the secondary screen. Scenario 2 represents an intermediate step that included more accurate information on emissions. Scenario 3 incorporated additional information on the type of chromium emitted by facilities and added updated benzene emissions. Scenario 4 was used to determine the contribution of individual facilities' benzene emissions to the total modeled benzene concentration in Wagners Point. Both toxic and criteria air pollutants were modeled using local meteorological data from the most current years available (1987-1988, 1990-1992). Generally, it is recommended that meteorological data over a five year span be used in air dispersion modeling to account for temporal variations. The highest predicted values either for the receptor locations (1 of 4) or for any given year (1 of 5) were typically used to make the screening as conservative as possible.

Suggestion 3.25 Provide clarification on the rationale for the selection of the discrete neighborhood receptors (e.g., Cherry Hill at a given lat/long)?

Response The document was revised on page 43 to describe the receptor locations. The Partnership area was defined by neighborhoods (Cherry Hill, Brooklyn/Brooklyn Park, Curtis Bay, Wagners Point) and by ZIP Codes (21225, 21226). The coordinates of the neighborhoods corresponded with their approximate geographic centers, which were used in the ISCST3 modeling to estimate ambient air pollutant concentrations for those four communities.

Suggestion 3.26 The document should include a fuller description of the airsheds and meteorology of the area.

Response No changes were made to the document in response to this comment. EPA feels that this issue is addressed sufficiently in the modeling methodology. Both toxic and criteria air pollutants were modeled using local meteorological data from the most current years available (1987-1988, 1990-1992). Generally, it is recommended that meteorological data over a 5-year span be used in air dispersion modeling to account for temporal variations.

Instructions/Charge

to ERG for

Peer Review of

Baltimore Screening Methodology

Instructions/Charge to ERG for Peer Review of Baltimore Screening Methodology

I. General Instructions

A. Conflict of Interest:

The Reviewer(s) shall not be a resident of the geographic area which is the subject of the report or the reviewer shall not be currently involved or have previously participated in technical support work affiliated with this document. In addition, the reviewers should not be affiliated with private organizations or stakeholders involved in this effort to the point that there may be a perceived conflict of interest.

B. Scope of Review:

The Case Study under review describes a risk-based air screening exercise carried out by the Air Committee of the Baltimore Community Environmental Partnership. The work of the Baltimore Air Committee consisted of the development of both a risk-based screening methodology for analysis of neighborhood air quality and also a partnership building process designed to increase participation and build the community's long-term ability to address air quality concerns. Peer reviewers are asked to provide feedback, as appropriate, on both of these aspects of the project. Questions on the risk-based screening methodology are given in General Charges 1 and 2 and in the Specific Charges. A question on the partnership building component is provided in General Charge 3.

As the work in Baltimore progressed, lessons learned and suggestions for improvements were identified and included in the case study. In Charge 2, peer reviewers are asked to comment on the improvements identified in the case study.

EPA would like the reviewers to focus on content issues related to the above. An editorial or quality control review is not requested.

II. Project Goals

The goals listed below were adopted by the Baltimore Air Committee as a guide to its work. Peer reviewers are asked to comment on the work of the Air Committee in light of these goals.

A. To determine if the current aggregate levels of toxics in the air in the Partnership neighborhoods resulting from the multiple industrial, commercial and waste facilities in and around the Partnership may adversely affect community health.

B. To recommend actions to improve air quality in the Partnership neighborhoods. (Recommendations to be based on the information on risk-based priorities provided by the screening exercise.)

C. To build the long-term capacity of the community, including residents and businesses, to take responsibility for their environment and economy.

III. Charges

A. General Charges

1. Did the screening methodology, as applied in Baltimore, achieve goals A and B?

2. The report identifies various technical improvements to the screening methodology. These are listed below. Could the methodology (emissions inventory, initial screen, secondary screen, final screen), as modified with the improvements identified below, help other communities seeking to understand and improve air quality? Please comment on both the appropriateness of the improvements listed below and their priority. Are there other improvements that should be considered?

   (a) Addition of mobile source modeling: The Baltimore exercise focused on stationary and area sources. This task will expand capacity of methodology to include mobile source modeling

   (b) Review and improvement of source inventory Review: Review existing source inventories to identify additional sources of emissions to insure that all significant sources are included

   (c) Identification of best source for toxicity data: Compare available toxicity data bases to identify most accessible and complete source of data for community screening exercise

   (d) Expand Baltimore methodology to include short term acute effects

(e) Review screening calculations to determine if they are appropriate for and protective of sensitive and urban populations

(f) Development of a method to screen for cumulative exposures in the Initial Screening Step

(g) Expand methodology to include indoor air risks to provide a more comprehensive picture of air risks

(h) Incorporation of GIS mapping to enhance the communication of the modeling and screening results

3. Are the partnership and community participation aspects of the screening exercise described in the case study and in the lessons learned section appropriate to achieve goal C? Could this screening exercise be used in other geographic areas to reach this goal. Can you identify any improvements or changes in the screening exercise that would help accomplish this goal?

B. Specific Charges: Please provide us feedback on the following aspects of the methodology, given project goals A and B:

1. The Emissions Inventory: Were the inventory of sources and the release and monitoring data used in the Baltimore screening exercise sufficient and appropriate to reach the goals of the committee? What additional sources do you think should be included in a source inventory to expand the scope of the methodology for use in other communities?

2. The initial screen: a) Were the methods for calculating airborne concentrations, potential dose, and risk appropriate and scientifically justified?; b) Was the screening criteria that was applied to identify chemicals for further analysis appropriate?

3. The secondary screen and the final screen: a) Was the modeling approach for developing estimates of neighborhood concentrations from multiple sources technically sound?; b) Was the screening criteria that was applied appropriate?; c) Were the assumptions built into the Region III risk-based concentrations appropriate.

4. Does the draft Committee Report (found in the appendix) adequately and accurately describe the screening exercise and its results?

5. Is the screening methodology as used in Baltimore sufficiently protective of sensitive populations? What would you suggest, if anything, for improving this aspect of the screening methodology?

Peer Review Comments

Michael A. Callahan

U.S. EPA National Center for Environmental Assessment

Peer Review Comments for

Baltimore Community Environmental Partnership Air Committee Technical Report

Michael Callahan

Senior Science Advisor - U.S. EPA, National Center for Environmental Assessment

A. **General charges:**

1. **Did the screening methodology, as applied in Baltimore, achieve Goals A & B?**

I think that at best, this project can only be termed a partial success in Goal A and a failure in Goal B. The methods for data collection worked well, analysis less well, getting consensus terribly, and the rest, particularly in dealing with the various agendas on the Committee, not well at all. Without all of the parts working well, this or any future project based on this methodology cannot be thought of as an overall success.

Hindsight can be valuable, especially if this methodology is to be applied to other cities and situations. One of the things I thought planted the seeds for the discontent realized later in the project was the stark contrasts between the questions the community had (pages 12-13), and the much narrower scope agreed upon for this project (bottom of page 13). I realize that many of the concerns of the community were not immediately answerable due to, among other things, lack of a workable methodology. On the other hand, even if the community agrees to the narrowed scope, and even if the project went off perfectly, there would still remain a feeling in the end that the community's questions were not answered. The paragraph on the top of page 56 talks about the need for the community to understand the limitations of this tool, but what about EPA's need to understand the questions the community is asking, and helping them get answers? If we have the "hammer" in this methodology, do we also have to see every question either as a nail or irrelevant?

If this methodology is to be applied to other communities, it is important that EPA find a way to at least address the other questions (which are very common ones communities ask), or *every* project will have a certain community dissatisfaction as a result. This is somewhat like "bait and switch," with the questions answered not being the questions asked. It may take the community a while to figure this out, but when they do, trust is lost, probably permanently.

It is not clear from the writeup (page 14) who exactly the "some Committee members" were that had the concerns about distracting the focus of the group from speaking "directly to the main community oncern," but in retrospect it seems a flawed decision. Apparently not everyone on the Committee understood the implications of only looking at air toxics emissions from facilities. It's not even clear that this was indeed "the main community concern," since concerns about air pollution also included odors and concerns about "midnight releases." Future applications of this methodology will have to take great pains to make sure everyone actually understands and agrees to what steps are to be taken, and the implications. There also should have been, again looking in retrospect, a contingency discussion. "What happens if we find no levels of chemicals above our health benchmarks? What happens if we can't document any permit violations? What if we **do** find something of concern? What are the next steps?"

In terms of general peer review question 1, Goal A was only partly successful on the surface. If viewed from the larger view of the community's concerns, it failed. A lot of data was collected and models run, but they only covered part of the picture (a significant part, nonetheless). The limitations of the data and methods did not allow the project to make a statement such as "the air levels of toxics are in a range EPA sees as safe, based upon conservative assumptions ($<10^{-6}$ cancer risk and <1.0 HI). Community concerns are directly focused on the safety of residents, and scientific temporizing is not satisfying to the community. Moreover, although data collection was successful, analysis and interpretation of results failed spectacularly. The last sentence on page 53, "A consensus on the interpretation of the results did not develop, and the effort was halted..." is a marvelous understatement. In looking forward to future applications of this methodology, we can also look forward to this type of disagreement unless specific ground rules and contingencies are built into the planned interpretation of the data. Questions like, "What if we find this? How will that be interpreted?" should (again, with hindsight) be discussed before any data are collected.

I think asking if Goal B was successful is a question that answers itself. If the Committee could not even agree on interpretation of the data, how could they recommend logical steps for the community to take other than generic ones? Only generic remedies would be quite unsatisfactory to the community after their expectations were raised by all the neighborhood data being collected, since they probably knew the generic steps beforehand (or at least the Committee could have listed them early on). Specifically, I can find no real recommendations in the "recommendations" section in pages 52-54. On benzene, recommendations were "postponed." For mobile source chemicals, the partnership was told to participate in nebulous "air quality improvements at the regional level," with discussion of what that means to be supplied later. For carbon tetrachloride and methylene chloride, "Recommendations were not developed...." As a batting average, this record is close to – if not exactly – .000.

2. **Various technical improvements in the methodology.... Are there other improvements that should be considered?**

There appears to be a serious imbalance between the technical methods used for data collection and analysis on one hand, and the development of the rest of the methodology (called Partnership and Community Participation in Goal C), including listening, interaction, teaching, negotiations, etc., on the other. This methodology simply *will not work* if the technical side is built up to the exclusion of the other side, as suggested by the list of bullets under this charge. Is the overall mission of this methodology project to build a new computer or GIS-based tool and release it to make the world a better place? Or is it to collect the tools and methods, and provide them, along with advice, to the communities to help them better analyze their situation and hopefully to better solve their own problems? I get the impression it is the latter, but the story reads like the former. Where are the questions about how to make the non-technical side better?

That being said, in my opinion, community assessment is a cumulative-risk-type operation. Anything that improves the ability to see, understand, interpret, and explain the "big picture" about what people are exposed to and where possible threats to health are coming from, is helpful. Mobile source monitoring would be helpful in the context that it can be linked to actual exposures and legitimate recommendations (which need to be thought about beforehand). As for toxicity data, there are no magic data banks that have the answers we have been seeking lo these many years. The usual ones, IRIS, HEAST, RBES tables, etc., are sufficient for now; they have to be, since there isn't much else out there. When new tox data become available, I'm sure it will be widely publicized within the toxicology, risk, and public health communities. Meanwhile, the methodology should note that before the methodology is applied at a new location, the currency of the tox data should be checked by someone who is knowledgeable about such things.

If acute effects are to be included in the methodology, a lot more work needs to be done on how the concentration values are to be obtained. Long term modeling for an area for chronic effects is one thing, but trying to evaluate acute effects possibly from a small pocket of air is quite another, and a modeling-only approach will probably not satisfy the community (there will be too many anecdotal incidents, for one thing). The issue of odors will have to be added to the acute effects analysis, also. The issue of acute effects will almost certainly require some on-site monitoring. All in all, it is a big, costly, addition to the methodology, but EPA may have to start moving in that direction if it wants to be relevant in answering the communities' environmental questions.

In terms of the screening methodology calculations, I do not believe EPA will be able to get away with saying "this is not a risk assessment" very much longer. The questions being asked by the communities (e.g., pages 12-13) have significant risk components, and to do calculations and say "this is not risk assessment" (and rightly so!) will eventually be viewed as avoiding answering the communities' questions and concerns. The technology exists now to estimate concentrations, develop exposure scenarios, etc. Within a short time, the ability to do multiple chemical modeling, at least on a screening level far better

than the Generic Turner Model, will be commonplace. EPA should aim its methodology at that. After all, we are no longer doing calculations on a piece of paper with an adding machine. This project took many years and there was ample opportunity to do fairly sophisticated technical analysis. We should start from that point, and analyze the chemicals that need to be analyzed, not reach back for tools like the GTM to get rid of things that might add to the cumulative risk.

Including indoor air methods may be the single best improvement to the methodology in terms of developing realistic and useful recommendations about how to improve the community's health. It is a mixed blessing, however, as many persons do not want anyone telling them anything about their own lifestyle or the way they keep their homes, which has a large influence on indoor air concentrations. It is invasive of one's lifestyle, expensive (NHEXAS=$17M), and often finds things that individuals would rather not see pointed out. But, *it gets results*. Adding indoor air methodology should not be taken on as an issue without eyes wide open as to cost and potential for highly charged discussions (case in point: the community representatives' leaving the Baltimore project was – according to their letter – due at least in part to their feeling that the analysis was moving in this direction, if only by suggestion of others on the Committee that lifestyle issues were important).

GIS mapping is a worthwhile addition to the methodology, and will probably be critical within a year. Communities will not have the capabilities to do their own GIS work in the short term, but perhaps within a few years the software will be available for tomorrow's PCs. Meanwhile, EPA should provide some help in running maps for the areas that use this methodology.

3. **Are the partnership and community participation aspects of the screening exercise in the case study and in the lessons learned section appropriate to achieve Goal C?...**

The lessons learned section is wonderful and right on the money. The improvement needs to be in the mind set which begins a case study like this. EPA can go into one of these with the approach of trying to help answer the community's questions, the sort of approach that's embodied by the statement, "I don't know the answer to that, but I'll find somebody that does, or find out what is known about that issue," and then follow through. Contrast that approach to one which says, "I have a tool here, but it can't answer all your questions. Let's see which ones it can shed light on or answer." The former is a real partner, while the latter is a helpful salesman. If partnership and community participation is a goal, it must be approached with the partnership attitude. A helpful salesman may be appreciated, but will never, and can never achieve the goal of being a full partner, with all the positive benefits that implies. A salesman, even a helpful one, will never quite be trusted completely.

B. **Specific Charges:**

1. **Emissions inventory.**

I was somewhat disappointed at the "winnowing down" methodology which modeled a collection of sources which represented 95% of the pounds of emissions. I think there should be a way to model all the sources that contribute. This will avoid questions about "what was left out of the analysis?" later. The smaller facilities won't add much, but the more complete analysis will be much more satisfying to the community. As far as emissions data, the sources will vary by state. TRI is universally suspect as to accuracy, but it's the best there is in many places. Most states have a database of facilities which includes smaller facilities not required to report to TRI (MDE had such a database here). At the very least, these two sources of data should be investigated in any case study. Local monitoring data and other local sources should be investigated on a case-by-case basis with help from the community and local government. As a footnote, *it is absolutely imperative that before modeling, the lat/long locations of the facilities be ground-checked.* TRI is notoriously bad for having inaccurate lat/long information, and a drive-around with a global positioning system (GPS) locator can save a lot of embarrassment later.

2. **Initial Screen.**

The Generic Turner Method essentially calculates an average concentration of a theoretical place 100 meters from a 3 meter high continuous release (essentially as a fugitive release at this height). If this is to be a bounding estimate (as it appears) to eliminate all the chemical-facility combinations that would not in themselves be problematic, the use of the 25% factor to lower the concentration at the 100 meter point by a factor of four seems to defeat the purpose. It would seem better to just assume the wind blows the same way all the time, and if the chemical-facility combination could not get above the benchmark criteria as a bounding estimate, then it would be eliminated from further consideration.

As for appropriateness of the criteria, I think that this will be a *very* conservative calculation, and should be labeled a bounding estimate. It will eliminate only those chemicals which should be quite a bit below the risk levels represented by the screening criteria, when more realistic exposure parameters are used.

I still feel that this step will eventually prove unnecessary and counterproductive, as discussed a few paragraphs above.

3. **Secondary and final screen.**

My opinion is that the several weeks of computer time needed to run ISC-LT3 was an unnecessary luxury for this screening exercise. The hourly and daily values calculated by the model (that chew up computer time like crazy) are just not needed. I suggest that either ISC-LT2 or some modification of ISC-LT3 that runs more efficiently be used. This would allow modeling of all the sources, rather than the methodology having artifacts like only modeling facilities which account for 95% of the load (which is a direct result of having a model that takes forever to run). I think the statement (end of 3rd paragraph, page 36) that, "Professional judgment was used to verify that omitted facilities would not affect the analysis"is silly. Either an analysis was done to *verify* that the omitted facilities didn't matter, or it was judgment, which of course doesn't *verify* anything. I think using ISC-LT3, in its current configuration, for this analysis is a big drawback. The additional accuracy of ISC-LT3 over ISC-LT2 may be more than eaten up by not having all the sources in the model. This could be checked fairly easily before this methodology is sent on to another case study.

The reason for the more restrictive criteria of the secondary and final screens (50% of the Region III criteria) was never explained satisfactorily, other than it was a group decision. This is another artifact of having a slow model, since with a faster model, you wouldn't have to exclude chemicals and would not find yourself explaining why you changed criteria - it would never come up.

The issue of screening with health-based values is a real problem here, and it is one that is not really taken head-on in the methodology. People in the community have health-based concerns and questions, EPA does an extremely conservative first screen, and yet EPA can say nothing about the relative safety of the air people are breathing? I know scientists are loathe to make such statements, but EPA's policy makers, if no one else, need to think about what can be said to the community, or EPA will forever be the (helpful) salesman and never the partner. Being "only" the salesman means that this methodology, no matter how many technical bells and whistles are grafted onto it, will ultimately fail to be embraced by communities. Having health-based criteria, and then punting at the end, is too confusing and looks like a hidden agenda to sweep potential problems under the rug to many in the community.

4. **Does the draft Committee Report adequately and accurately describe the screening exercise and its results?**

The draft Committee Report is quite well written and describes the project in some cases better than the full report. I have several comments on it. I like the sentence under #5, paragraph 2 that says, "A screening value is an air concentration that the Committee is confident does not pose a significant health risk." This is about as close as it gets to saying "a safe level." It would be helpful to note here that there were a couple of dozen other chemicals that were found or modeled that fell below this level. Later in the

same paragraph, it might be useful to point out (top of next page, sentence ending "...cannot be directly compared.") that the State standards may also be levels that do not pose a significant health risk, but the Committee chose its screening levels so that the committee could make the above definitive statement.

Under #10, it states that volunteers are needed, but doesn't say how one might volunteer or to whom. The first set of figures (Figs 1-4) have no units.

One unsettling aspect of the report is that it leaves one huge question unasked and unanswered. **Why did the modeling results show essentially no chemicals above the criteria, yet the monitoring data showed four of them?** Does this mean that for individual neighborhoods where models were run and nothing found, if monitoring data were taken there, toxic pollutants above the "safe" criteria levels would be found? This is an important question that goes directly to the credibility of the report with the public. Somebody out there **will** ask this question!

5. **Is the methodology sufficiently protective of sensitive populations?**

As far as I can tell, no effort was made to address this question at all in the study. It isn't the methodology that's "protective" anyway, it's the health-based screening criteria. The way the screening criteria were selected leads me to believe "the methodology" would allow any new committee for a new case study to select any criteria they wish (after all, that's how it was done here!). Without some limits, this question can't be answered.

If the question means, "Are the screening criteria as used here protective of sensitive populations?", that's a different question, but it still can't be answered without doing the homework necessary to come to a reasonable conclusion. This report shows no evidence of such homework, nor does it even get into much discussion about why the criteria values themselves were selected. Without some record of the logic used, I would have to conclude, "not necessarily."

Peer Review Comments

Gail Charnley, Ph.D.

HealthRisk Strategies

Comments on EPA's Baltimore Community Environmental Partnership

Air Committee Technical Report

Gail Charnley

19 November 1999

General Charges

1. Achieving goals A and B

The screening methodology, as applied in Baltimore, partially achieved goal A and has not yet achieved goal B. Goal B involves making recommendations to improve air quality in the study area, but that issue is not addressed in the technical report.

The screening methodology indicates that the contaminant sources evaluated do not exceed threshold risk values. Given the conservative (health-protective) nature of the assumptions underlying the methodology, the conclusion that those sources do not contribute to adverse health effects is likely to be correct. The results of the project were limited by its focus only on air toxics from point and area sources, however, which are fairly extensively regulated. Focusing on air toxics while ignoring important sources of the more prevalent criteria air pollutants yielded an incomplete picture. Thus it is possible that poor air quality does contribute to public health problems, but by failing to look at the whole picture, the study could not answer the question. The report readily admits that not evaluating mobile sources is a problem. As mobile sources appear to be major contributors to air pollution in the study area and in urban areas in general, it is important that future efforts attempt to include them.

2. Technical improvements

The list of needed improvements is excellent. I'm not sure that including indoor air risks in the methodology itself would be useful or practical, however. Comparing ambient air risks to some general estimates of indoor air risks might be more useful and practical. The only improvement I might add is to consider using a professional facilitator for future efforts. There is a growing literature suggesting that professional facilitation by someone who is experienced in community stakeholder-type efforts is fairly critical for success.

I think that the priority of the improvements matches the order in which they are listed.

3. Achieving goal C

The partnership aspect of the project was clearly troubled. To some extent, it seems that the partnership aspect was doomed from the start. By focusing on the question of what the risks are from air toxics, the project was based on the implicit assumption made by the community that air toxics play a role in their health problems. The community clearly started with an assumption that poor air quality in Baltimore poses an unacceptable risk to their health and when that assumption was not verified, withdrew from and condemned the project and its outcome. The project thus only partly achieved goal C. By not asking the question—What factors contribute to health problems in the community?—and then finding that air toxics do not contribute to health problems in the community—the project was left in the uncomfortable position of being unable to recommend solutions to the real problem. Building community capacity to take responsibility for their environment and their economy was thus only partly achieved. The contribution of air quality to public health problems should have been addressed within the framework of the larger question being addressed by the community health committee.

I believe that the screening method could be used in other communities to help understand the role that air toxics may or may not play in public health, but it should *not* be used by other communities unless it is part of a larger project looking at both other sources of air pollution and other potential contributors to public health problems. While it was not a complete risk assessment, the method provided enough information to draw conclusions about the likely role of some kinds of air pollution in public health and is a good basis for priority-setting and for evaluating potential cumulative effects.

It might be helpful to make it very clear at the start what the project can and cannot accomplish because, while it did answer the narrow question being asked, it did not answer the broader concerns of the community.

The report should comment on how the members of the technical committee were chosen. Did the nontechnical community members and environmental advocates participate in the selection? Trust in the outcome might have been improved by allowing all participants to take part in selecting those who conducted the actual screening efforts.

It might also be interesting to know how the nontechnical community members reacted to the screening concept. I often worry that a big risk communication challenge is presented by identifying a list of chemicals of potential concern in an early screen and then eliminating them by further screens. (Just

kidding! They weren't toxic after all!) I think this problem was recognized by the air committee, but some elaboration on their concerns and how they were addressed might be instructive.

Specific Charges

1. Emissions inventory. As noted above, future projects should include mobile sources.

2. Initial screen. (a) The screening methods were pretty crude, but that's why they call it an initial screen, I guess. The methods were justified by science policy more than by science. (b) The screening criteria were appropriate. They were certainly health-protective, but not so extreme that all chemicals were tagged as being of concern for the next tier.

3. Subsequent screens. (a) I am not technically qualified to comment on the exposure assessment methods. (b) The screening criteria were appropriate, for the same reason as above. (c) The assumptions underlying the Region III risk-based concentrations are okay for a screening exercise, which this was, but not for performing risk assessments. Some additional explanation regarding the choice of RfDs instead of RfCs would be useful.

4. Committee report. The draft committee report accurately describes the screening exercise and its results, but I agree with the authors that it is probably not very accessible for nontechnical community members. The extra efforts being made to make it so are a good idea.

5. Sensitive populations. Due to the very conservative, precautionary-principle-based assumptions underlying the screening methods, they are sufficiently protective of sensitive subpopulations. In particular, the toxicity estimates are designed to be very health-protective.

Extraneous Comment

The box on page 23 that addresses risks and hazards perpetuates the false "carcinogens are nonthreshold/noncarcinogens have thresholds" dichotomy. A qualifier along the lines of "For regulatory purposes it has been assumed that . . ." should be added, along with the information that current scientific evidence indicates that some carcinogens have thresholds and some noncarcinogens do not.

Peer Review Comments

Douglas Crawford-Brown, Ph.D.

Department of Environmental Science and Engineering

University of North Carolina at Chapel Hill

Review of Baltimore Community Environmental Partnership Air Committee Technical Report.

Douglas Crawford-Brown

Professor

Director, Office of Environmental Academic Programs

Chair, Environmental Sciences and Studies

University of North Carolina at Chapel Hill

A. General Charges

Question 1. I am somewhat divided on the answer to this question. Let me first say that the risk assessment methods used in the report are generally of sufficient quality, and certainly go beyond those normally used in community risk assessments. The Committee should be commended for the effort shown in this report. The risk assessment methodology will provide conservative estimates of risk under most circumstances and, therefore, provide a sufficient basis for claims that health is being protected. In this light, therefore, I believe the assessment will meet the stated goals.

Still, I am always concerned when screening approaches are used to select out a set of chemicals for more refined study. I realize the need to try to narrow the number of chemicals for more refined assessments, especially since the final screen involves data collection on individual chemicals that can require significant time (and would delay risk management decisions). The first screening level is presumed to produce highly conservative results. The presumption is that the final level of screening, if it were performed on those chemicals excluded after the first screen, would always produce risk estimates that are lower than the values in the first screening calculations. If this is the case, the purpose of the first screening will have been satisfied (i.e. it will have excluded chemicals that would have been shown to pose no appreciable risk in the final screening, thereby saving resources and time).

But I see no explicit demonstration that the presumption above has been satisfied here. I SUSPECT it was satisfied, since it usually is satisfied in my own experience, but there also are cases in which it is not satisfied. One way to check this would be to ensure that, for the chemicals passing all the way to the final screen, the risk estimates under the final screen are, in fact, less than those estimated in the first screen. This would provide greater confidence that the chemicals excluded by the first screen were not likely to pose a greater risk under the assumptions of the final screen.

In addition, by removing chemicals at the first screen (in fact, by removing a large fraction of the chemicals), the Committee raises the possibility that the cumulative effect of these excluded chemicals might be appreciable even if the individual effect falls below a screening risk value. This is always a potential problem

with screening approaches and, again, I am sympathetic with the need to narrow the list of chemicals to allow timely completion of the final screen, but the potential effect of excluding chemicals early in the process of considering cumulative risk should be mentioned.

I also worry a bit that a formal variability and uncertainty analysis was not performed. The goal of such an analysis would be to determine if there might be susceptible and/or sensitive individuals whose risk is larger, and to determine the confidence with which it may be stated that risk goals have been met. Presumably, the Committee is assuming that use of the RBCs and somewhat conservative models already addresses these issues. This may or may not be true. An explicit statement to that effect, with supporting evidence, would improve the assessment and give greater confidence that the public health is being protected. The issue of variability is particularly germane given the recent EPA focus on risk to children (initially under the FQPA and SDWA, which do not apply to air releases, but increasingly in all program offices). The report should state whether risks to sensitive subpopulations, including children, have been modeled adequately.

Finally, I raise an issue with Figure 5 on page 49. In that figure, it appears to me that 88% of the benzene measured at the FMC monitoring station is unaccounted for. I am not sure what this means, and the report is not clear. Does it mean that the measurement is a factor of almost 10 below the measured concentration? That is how I interpret the results. If that is the case, might this suggest that the model in general is underpredictive, and that the degree of underprediction for other chemicals might be similarly large? If that is the case, some chemicals may have been screened out inappropriately. I am not saying this is the case, only that the report does not provide me the information needed to determine if this is the case. Something should be added to the report to address this concern.

Question 2. I will address the parts of this question in separate paragraphs in the order in which they appear in the charge.

Mobile source modeling would be desirable scientifically, but it is a very difficult form of modeling. Collecting the data bases, separating emissions by time of day and season, estimating route patterns, estimating length of time a vehicle has been running (which affects emission rate), etc, is a daunting task, especially when it is placed on top of the task of estimating concentrations from stationary sources. Still, it would improve aggregate and cumulative risk estimates, and would help identify other risk management options. Of the 8 additions listed, I rate this addition 5 (on a scale of 1 being lowest priority and 8 being highest).

I feel the sources identified are an adequate representation of the total sources. I believe it is unlikely additional sources will change the risk results appreciably. I rate this addition 2.

The IRIS and HEAST databases are the appropriate ones for such information. The OSW is considering an expedited review process for assigning toxicity (RFD/RFC and CSF) for chemicals not currently in IRIS or HEAST as part of their HWIR project. The Committee might consider contacting that office and seeing

where this process stands. I rate this addition 6 since it might cause some chemicals to enter final screening that currently are not included due to missing toxicology information.

I doubt that short term acute effects would be missed by the screening methodology. It is rare that these drive the risk assessment and risk management decisions (although there are exceptions). The more common case is that risk management decisions based on protection against more chronic effects is also protective against short term, acute, effects. The exception tends to be when a facility is short-lived, or emits very sporadically, but I see no evidence that these cases apply to this study. I rate this addition 3.

I do believe this is an issue, as discussed in my comments previously. The current hope in developing RfD/RfC values, and CSFs, is that all sensitive subpopulations are included within the uncertainty factors employed. While this may be true, it is a controversial claim at present and so the EPA has been sent back to the issue by Congress in the FQPA and SDWA, with an explicit charge to consider if it is true for children. At the least, the study should include consideration of the issue by determining whether any of the chemicals which just barely missed the screen (i.e. were marginally excluded from the final assessment) might be likely to pose risks to sensitive subpopulations not captured by the current uncertainty factors. I personally believe the current RfD/RfC and CSF values do protect even the most sensitive subpopulations, but it would be best to consider the issue explicitly in the study. I rate this addition 7.

I believe this is an important issue, if not in the first screen at least in the intermediate or second screen. Cumulative exposures can now be estimated fairly routinely with existing models (such as the models used in developing the RBCs), and may show very different results. A particular problem with considering only the inhalation pathway (as in the first two screening levels, unless I misunderstood what was done in these screens) is that ingestion can be a significant contributor to risk for many products of combustion. Mercury, for example, can show a dominant pathway from seafood consumption, and dioxins can be dominated by beef ingestion. The cumulative assessment could easily show that some chemicals excluded at the lower screens should have been carried forward into the higher screens. I rate this addition 8.

I am not sure what is meant by this. One possibility is that it refers to the fact that pollutants in the ambient air may enter the house, and then result in exposures that are higher than those estimated when only ambient air is considered (the methodology used in the study does not seem to consider such a possibility). If that is what is meant, the issue is somewhat important but not likely to significantly change the results of the assessment. Another possibility is that indoor exposures are to be estimated based on emissions in the home itself, as a means to provide a comparative risk assessment. It is increasingly clear that overall risks to health may be driven more by indoor exposures than by exposures to ambient air. These indoor exposures are caused, however, by activities under the control of individuals. My understanding of the current study is that it was intended to identify significant sources of pollution in the ambient air, which is a common good rather than an individual good. So, while such an assessment may help to place risks in context, it probably would not change the overall conclusions on public health protection. I rate this addition 1.

I am not sure what is meant by this issue. GIS is useful not simply as a communication tool, but also in estimating risk. With respect to communication, GIS provides no more information than a well-drawn map (in fact, the GIS data base often is obtained from such a map). So, I do not believe GIS would improve communication, except in the sense of facilitating the production of maps that can be overlain to display regions of highest pollution, regions where subpopulations are located, regions of sources, etc. With respect to estimating risk, I had been presuming that the final screening used something akin to GIS to locate

subpopulations for purposes of estimating exposure. If it was not used in that way, it should be considered but not given high priority unless (1) the focus shifts from individual risk to population risk and (2) the inhomogeneity of exposure is large even in small regions (where the additional information on location of individuals within a grid block might significantly change the risk estimates). Still, people moving about during the day usually obscures the additional information provided by GIS. I rate this addition 4.

Question 3. I liked the partnership and community participation displayed in this study. It is a commendable effort and should be continued. Without it, siting, regulatory and other decisions are likely to remain more contentious than they currently are. Having said this, it is still not clear historically whether such efforts really improve the decision process and make it less litigious. The danger is that a lot of effort goes into such a process, everyone participates until the final report is released, and then parties who do not like the conclusions still sue. But at least everyone has a common point of comparison and no one can claim they were not present when the risks were estimated. So, I am hopeful and recommend extending this method to other communities. We are now in the position scientifically, and with respect to computation and visualization resources, to make models available to such groups that will remove the formerly high barrier of technical expertise needed to produce risk assessments.

B. Specific Charges

1. I believe the source inventory was adequate for this exercise. I believe it is unlikely that additional significant sources will be identified by any more detailed collection scheme.

2. The initial screen was appropriate if the inhalation pathway dominates. The Turner concentrations provide an adequately protective screening tool (I compared them against the results of the plume model in the course of this review and they compared quite favorably to the highest values in the plume). I am worried, however, that chemicals for which the inhalation pathway does not dominate will be excluded incorrectly at this early stage. This is particularly worrisome since it has been my experience that non-inhalation pathways are the dominant risk pathways even for combustion sources, where inhalation risks are most likely to be significant. I believe the Committee should consider this point more carefully. A possibility is to adjust the initial screen by multiplying the inhalation risk by a factor (above 1) that is the highest ratio of total risk to inhalation risk under some prescribed scenario where the full pathway model has been run.

3. The final screen was completely appropriate. I do not believe the secondary screen was really needed, unless it was felt that the time needed to conduct the final screen on 22 chemicals was too large to be of use in decision-making. I continue to worry about the fact that the secondary screen (as in the case of the initial screen) does not consider aggregate risk.

4. Yes, this is a well written report that is simple to follow.

5. I believe it is, but there should be some review in the report of the reason for the Children’s Health Initiative, the FQPA and the SDWA amendments, and the implications for this study. At the least, the report should include a discussion as to why current uncertainty factors used in developing RfD/RfC values do or do include the sensitive individuals.

Peer Review Comments

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Review of Baltimore Community Environmental Partnership Air Committee Technical Report

Draft Document prepared by the US Environmental Protection Agency

Office of Pollution Prevention and Toxics, November 5, 1999

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Charges to reviewers

A. General charges

1. Did the screening methodology, as applied in Baltimore, achieve goals A and B, which were to determine if the current aggregate levels of toxics in the air in the Partnership neighborhoods resulting from the multiple industrial, commercial and waste facilities in and around the Partnership may adversely affect community health and (B) to recommend actions to improve air quality in the Partnership neighborhoods (recommendations to be based on the information on risk-based priorities provided by the screening exercise. (C) To build the long-term capacity of the community, including residents and businesses, to take responsibility for their environment and economy.

The screening methodology did not address the fundamental challenge of how to consider and assess the health significance of the aggregate burden of pollution. Instead, it winnowed down the list of chemicals emitted through a screening process that treated each chemical, and, to some extent, each source, separately. This does not seem to achieve the first goal of the project. There is little integration of hazardous air pollutants and criteria pollutants.

The recommendations in the document for improvements in air quality are limited. They do not address reduction in the overall burden of air pollution but rather focus on the four chemicals identified as being of greatest concern individually. This approach might be more accurately described as addressing the "worst" hazardous air pollutants rather than the aggregate burden of pollution.

It is difficult to assess from a document like this whether gains in community capacity were achieved. Given the ultimate withdrawal of some of the original participants and lack of participation in the screening process, it would appear that there are questions about this.

2. The report identified various technical improvements to the screening methodology. Could the methodology, as modified with the identified improvements, help other communities seeking to understand and improve air quality? Comment on the appropriateness of the improvements listed below and their priority. Are there other improvements that should be considered?

As noted, this methodology does not address the fundamental question of how to consider the aggregate burden of pollution for a community. It relies on a chemical-by-chemical assessment paradigm. This does not appear to be responsive to the basic questions being asked by the community. Addressing the improvements recommended by the committee, though they may be advisable, will not solve this basic problem.

Specifically, it is extremely important to include mobile sources when assessing hazardous air pollutants. Also, area sources, as typically defined by EPA, should be added.

With regard to the "best source" for toxicity data, the problem is not so much identifying the "best" source but rather identifying "any" credible source for relevant toxicity data for many chemicals, especially for inhalation exposure. The fact is that existing sources are simply not adequate. This problem needs to be rectified for assessments like this to truly reflect health significance of pollutants. At this point, it is not responsible to represent the toxicity database as sufficiently complete to allow for full assessment of the likely health significance of hazardous air pollutants, even if the emissions and modeling approaches were impeccable. An assessment based on the current toxicity databases should be represented as a likely under-estimate.

It would be a simple change to include short-term acute effects, though unlikely to lead to important differences in the results.

With regard to the protection of sensitive and urban populations, the issue is not simply the screening calculations but rather that the toxicity data base does not exist for the protection of infants and children from effects of toxic substances. With regard to urban populations, the key issue is the significance of cumulative exposures to multiple pollutants. This methodology, as noted elsewhere, does not fundamentally address this.

With regard to adding indoor air risks, it would seem that there are sufficient issues to address for outdoor air risks. Adding another suite of issues would not seem to be a high priority.

GIS mapping would improve the document and presentation.

Specific Charges.

Comment on the following, given goals A and B.

1. *Emissions inventory – were the inventory of sources and the release and monitoring data used in the Baltimore screening exercise sufficient and appropriate to reach the goals of the committee? Should additional sources be included in a source inventory to expand the scope of the methodology for use in other communities?*

As noted elsewhere, it is critical to include mobile sources when providing assessments of air pollution. Mobile sources should be included in any future assessment project.

It is not entirely clear from the document whether what are usually known as "area" sources are included in this assessment. This analysis appears to use a definition of area sources that is different from what is usually meant by this term. This is rather unfortunate, as this will be confusing to any but the most careful readers of the document. The analysis appears to consider area sources that are like impoundments or lagoons that provide releases of air pollutants over a space that is better represented as an area than a point, in contrast to stationary sources. However, the normal definition of area sources includes many small sources, most of which will not have these characteristics. Area sources may be of particular importance in cases where people live in close proximity. Future such projects should incorporate all the important sources of air pollutants – stationary, area, and mobile sources.

Some pollutants may be present in the environment due to historical releases or may have significant background concentrations. Carbon tetrachloride is an important example of a compound that is no longer widely released but which remains present in the environment. To gain a complete picture of air pollutants, background sources should be considered in addition to current releases.

The monitoring data available for this study were limited to observations from a single site. However, these data were influential in identifying several pollutants that were not predicted to be present in important amounts by the modeling. This might raise a red flag. It may be that, for methodology of this type to be accepted, field confirmation of the predictions is needed. In this case, despite the representations of

conservative and health protective methods, the modeling predicts substantially lower concentrations of all measured pollutants than are actually found. This leads to doubts about whether the predictions are correct. This discrepancy should be discussed in the document. If there is a reasonable explanation for the differences, it should be presented. If there is not, then perhaps future such projects should establish and operate monitors for the periods that are to be monitored to provide a reality check for the modeling.

It may be appropriate to evaluate other models that can accept a broader range of data and better characterize pollution from sources other than stationary sources. The ASPEN model used in the EPA cumulative exposure project appears to have achieved better correlation with monitoring data than the approach used here. A description of this is included in a manuscript been accepted for publication. [1]

Additional information is posted at the EPA website on this project
(http://www.epa.gov/ttn/uatw/cep/paper.html.)

It would seem appropriate to use some verification for the estimates of releases included in this document. These are based on permit conditions and self-reported results. Some field verification of at least some of these estimates would inspire more confidence in the results.

When reviewing monitored data for hazardous air pollutants, it is critically important to determine the detection limit for the methods used. Because there are not standardized methods for hazardous air pollutants, as there are for the criteria pollutants, states may use different methods. Some methods used by some states have detection limits that are higher than health benchmarks. It would be important to determine whether this was the case here and, if so, how any values reported as being below detection were handled.

It is not entirely clear that the area selected for analysis would include all sources contributing to pollution in the target area. The document did not discuss how the geographic area was selected. For some pollutants, transport can be important. If this methodology is to be developed for use in other situations, it would be important to analyze carefully the spatial area that needs to be considered to capture all sources of pollutants that might affect a neighborhood.

[1] Rosenbaum A, Axelrad D, Woodruff TJ, Wei Y, Ligocki M, Cohen J. National estimates of outdoor air toxics concentrations. Journal of the Air and Waste Management Association 1999;49:174-185. {I do not have the published paper as yet to send to you.}

2. *Initial screen – Were the methods for calculating airborne concentrations, potential dose, and risk appropriate and scientifically justified? Were the screening criteria that were applied to identify chemicals for further analysis appropriate?*

The methods used for the initial screen do not seem to be consistent with the overall goals of the project, nor with the methods used later in the project. The document recognizes that it might have been better to use some of the methods used in the later screen for the earlier screen.

The goal of the project was to assess the aggregate levels of toxics in the air in the partnership neighborhoods. Yet, the first step in the project was to use a strategy of treating each chemical or contaminant separately and screening out those not found, by themselves, to exceed a benchmark hazard index or cancer risk estimate. This approach would appear to be at odds with the overall goals of the project. If you want to assess the significance of aggregate pollution levels, then you need to consider the aggregate burden of pollution and to use methods that would reflect this.

Within the approach adopted, it does not seem to make sense to use a more health protective approach to screening at a later step in the assessment and to use a less health protective approach at an earlier stage in the screening. Specifically, the first screening step calculates a cancer risk of the modeled concentrations in the target area and compares it to a one in a million risk level. It also compares the dose resulting from a modeled concentration to a reference dose. Yet, at later stages, the approach is to compare the modeled concentrations (or monitored concentrations) to half of similar benchmarks. This does not make sense.

It does not appear that the analysis considered the question of the persistence of chemicals in the environment at any stage. This could be important, as ambient concentrations will reflect both the input to the area and the time that a contaminant remains resident.

The document switches back and forth between the use of the term reference dose and reference concentration. It appears that the approach used is to calculate the equivalent of a reference dose based on reference concentrations. This would be a per body weight dose, but derived from studies and analyses relevant to inhalation exposure. This usage is rather confusing, as in most cases, the term reference dose is used to refer to toxicity through routes other than inhalation, particularly ingestion, while the term reference concentration is based on the toxicity resulting from exposure through the inhalation route. While the approach used here may make sense, it again leads to confusion. Perhaps another term could be selected.

A critical element in the analysis is the selection of the toxicity values used as points of comparison. It would be most helpful if these could be clearly identified at some point in the document. The values used for the initial screening do not seem to appear at all. Only some of those used for the second and third

rounds of screening are included in the materials supplied by Region 3. It would be most helpful to pull out the chemicals reviewed here and compile the various reference values that were used. It is very difficult to answer this question without better information about what was used.

3. *The secondary and final screens – Was the modeling approach for developing estimates of neighborhood concentrations from multiple sources technically sound? Were the screening criteria that were applied appropriate? Were the assumptions built into the Region III risk-based concentrations appropriate?*

Though modeling of air pollution is not my area of expertise, it would appear from a comparison of the modeled estimates and the monitored data that the modeling was not accurate. This suggests that it was not technically sound.

It is not entirely clear what assumptions are being referred to here, with regard to the Region III risk-base concentrations.

4. *Does the draft Committee Report in Appendix J adequately and accurately describe the screening exercise and its results?*

The draft committee report is somewhat difficult to follow and would benefit from the addition of graphics. That said, accuracy could be improved with regard to the issues identified below.

First, Appendix J implies that the modeling captures all of the facilities that are contributing pollutants to the area. Facilities are included only if their emissions exceed a screening level. This means that the modeling will under-predict the overall concentrations.

Second, the appendix does not reveal the discrepancies between the model predictions and the monitoring results. These cast doubt on the accuracy of the modeling. This should be disclosed and discussed.

Third, the appendix does not fully describe the sources that not included in the exercise.

Fourth, the discussion of the screening levels does not explain that each chemical was compared separately to the cancer screening concentrations. The overall cancer risk that might result from combining exposures to many chemicals, each of which is below the screening target, was not assessed. This seems to be obscured in the report.

Fifth, the descriptions of the limitations of the study seem to point to issues that are less relevant than the genuine limitations of this analysis. This appears to suggest that the principal limitation is a lack of data on time and activity patterns. However, there is nothing in the charge to the group suggesting that people expected this kind of detailed information. It appears that they expected an assessment of outdoor concentrations overall. This might be seen as a lower bound on the exposures that individuals might experience, because concentrations are often higher indoors than outdoors. It would be more fair to this process to point out the limitations of the study to answer the initial questions of the people in the

community rather than to point to additional research questions not initially included. Similarly, explanations that emphasize the significance of diet and heredity seem quite beside the point of this analysis, which is supposed to focus on air pollution.

Sixth, the document does not provide the best available estimates of outdoor concentrations of these chemicals, but only of certain of the chemicals that passed a screening process.

5. *Is the screening methodology as used in Baltimore sufficiently protective of sensitive populations? Please suggest any improvements of this aspect of the screening methodology.*

See previous comments.

Page-specific comments.

Page 5. Given the erosion of participation in this project, the sponsors might consider whether it is consistent with the initial design to move forward with a report.

Page 13. The potential for violation of permit conditions is not addressed in this methodology.

Page 16. To reach conclusions from an analysis such as this, it would be important to include all pollution sources, including those noted at the bottom of page 16 as being excluded.

Page 23, first full paragraph. It would seem to be important to have community representation during the selection of screening levels. The lack of representation is troubling.

Page 23-25. A table of values used should be included here. An assessment of the data gaps in the underlying toxicity database should also be included.

Page 26: calculation of the air concentration and potential dose. This method appears to compare the estimated concentration of each chemical at each facility to a screening value. If this is the correct interpretation of the text, it is difficult to determine how this would integrate exposures from multiple sources. If each of ten sources of a chemical each produced a concentration below the screening level, it would be excluded. Yet, taken together, they might result in a concentration of concern, even for a single chemical.

Page 27. For air pollutants, the assumptions of exposure duration of 24 hours per day, 365 days per year, may not be particularly conservative for urban populations. Pollution concentrations are fairly consistent in urban areas; there are not many places people can go to reduce their exposures.

Page 29, table at the top of the page. It is not clear from this table whether the entries represent what might come from one facility or from all of the facilities for the chemicals identified.

Page 30. Should include a summary of the monitoring results, with all chemicals and annual mean values.

Page 30, box. The reasons for excluding these chemicals should be further developed. Some of these chemicals can also have area sources and should not be quickly excluded. Having a committee use "professional judgment" to exclude chemicals without clear explanation is not a transparent process.

Page 30, last paragraph. It would be important to address aggregate exposure at the initial screening step. Otherwise, sources and chemicals have already been excluded. The results described here should be demonstrated in the report.

Page 31, first full paragraph. Several of the criteria pollutants are mentioned here as being included, but the methodology does not seem to address these pollutants.

Page 37, first paragraph. The alternate definition of an area source is given here. This is very confusing. It also appears that those sources usually defined as area sources are not included in this analysis.

Page 37, second paragraph. It would strengthen the analysis to demonstrate the actual emissions are indeed below permitted levels. Compliance or other data might be available to allow this.

Page 40, last paragraph. It would seem appropriate also to consider overall cancer risk.

Page 49. This chart requires some explanation. Again, it would appear to demonstrate that the modeling was not technically sound.

Appendix D. Should include the Region III table, the ATSDR MRLs and the IRIS values.

Appendix I. Should be highlighted. The contrast between the predicted and measured values is striking. Check the detection limit for vinyl chloride.

Peer Review Comments

Kenneth L. Mitchell, Ph.D.

U.S. EPA Region 4

Kenneth L. Mitchell, Ph.D.
USEPA Region 4
November 29, 1999

GENERAL CHARGES

8.Did the screening methodology, as applied in Baltimore, achieve goals A and B?

In a broad sense, the Study did achieve the goals outlined in A and B. The analysis did lead to an assessment of the levels of toxics in the Partnership neighborhoods that may adversely affect community health. And the report does include specific actions to improve the air quality in the area. However, as discussed below, the efficacy of the methodology used to accurately reflect the potential health impacts of air pollutants can be improved upon.

9.The report identifies various technical improvements to the screening methodology. These are listed below. Could the methodology (emissions inventory, initial screen, secondary screen, final screen), as modified with the improvements identified below, help other communities seeking to understand and improve air quality? Please comment on both the appropriateness of he improvements listed below and their priority. Are their other improvements that should be considered?

The methodology, as modified with the improvements identified below, could help other communities seeking to understand and improve air quality.

1.Add mobile source modeling: The Baltimore exercise focused on stationary and area sources. This task will expand the capacity of the methodology to include mobile source modeling.

The methodology would benefit strongly from the inclusion of mobile source emissions and an evaluation of their impact on the overall concentrations of toxic chemicals in ambient air. (Indeed, the document would also benefit from some analysis of the impact of all criteria pollutants as well.) It is clear from recent modeling exercises (USEPA, 1999)[2] that mobile sources can have a very significant impact on the overall quality of air, particularly in urban areas. An appraisal of these sources will lead to a much better understanding of the problem at hand as well as more effective strategies for protecting public health. (High priority)

[2]See http:\\www.epa.gov\cumulativeexposre

2.Review and improve the source inventory review: Review existing source inventories to identify additional sources of emissions to ensure that all significant sources are included.

A well developed emissions inventory is crucial to the success of a screening process. However, there is a point of diminishing returns where tracking down every small release may provide little additional information (unless there is some reason to believe that there are so many small sources that, in toto, they would prove a significant source). Based on my more limited knowledge of building source inventories, the level of detail identified in this document for the development of a source inventory seems appropriate and should suffice to meet the goals of the project. (Medium to low priority)

3.Identify the best source for toxicity data: Compare available toxicity data bases to identify the most accessible and complete source(s) of data for community screening exercises.

It is crucial that toxicity values which have been peer reviewed by persons knowledgeable in the field of toxicology and epidemiology be used to evaluate potential health impacts for toxic air pollutants. Given that a number of such values may exist for any given chemical, it is also crucial for trained scientists to review the available literature and select toxicity values that are scientifically supportable.

A complication in the toxicity factor selection process is that a number of science policy decisions must be made. For example, if a particular chemical is generally considered to be a potential human carcinogen, but there is disagreement over the published findings in the toxicological or epidemiological literature about its relative potency, a decision must be made as to whether and how far one will go in developing a carcinogenic potency slope factor. Any number of other "science policy" scenarios can be mentioned which affect almost any health assessment (including the one described in this document).

It is crucial, therefore, *that before a study begins*, the stakeholders identify a hierarchy of toxicity data sources as well as decisions on how they will address the numerous science policy issues that will come up during the assessment. The assessors should then apply these decisions consistently throughout the entire process. For example, in this document, step 1 apparently relies on IRIS and HEAST toxicity values only. Step 2, however, uses the Region 3 RBC methodology (which relies on IRIS, HEAST, and several other sources of toxicity information). Unless there is good reason (e.g., updated toxicity studies), "changing course in mid-stream" on toxicity issues or science policy determinations can seriously compromise the overall supportability of an assessment.

This is not to say that the process cannot include flexibility. Indeed, stakeholders may wish to delve into the literature in their search for a supportable toxicity value. Nevertheless, a

process for performing such evaluations should be established at the outset of the assessment, with a clear understanding of when such an analysis will be undertaken and by whom. (High priority)

4.Expand the Baltimore methodology to include short-term acute effects.

Acute toxicity is clearly an important issue for communities and should generally be addressed by the methodology. One issue with acute toxicity evaluations is the lack of consistently derived toxicity values appropriate for the types of exposures that would be of concern in such evaluations (i.e., acute toxicity values protective of the general public under routine exposure conditions).

Similar to chronic toxicity information, it will be crucial for any acute exposure evaluation to clearly define the rationale for the selection of the toxicity values used in an assessment. For example, the use of occupational values divided by some uncertainty factor would need clearly stated and supportable evidence that such a methodology would result in screening values appropriate for the exposures at hand.

One recent attempt at deriving acute toxicity values protective of the general public under routine exposure conditions was undertaken by the California EPA. We suggest reviewing their methodology for developing Acute Reference Exposure Levels[3] if acute assessments are to be included in a later edition of this methodology. (High priority)

5.Review the screening calculations to determine if they are appropriate for and protective of sensitive and urban populations.

As noted elsewhere in this document, the current screening calculations should be reviewed with an eye towards establishing and documenting the logic behind the screening process as well and the numerous technical details that form the basis for the methodology. In its current state, there are technical flaws which call into question the appropriateness of this methodology for evaluating impacts to sensitive and urban populations. (High priority)

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[3]California EPA (1999), *Technical Support Document for The Determination of Acute Reference Exposure Levels for Airborne Toxicants as part of the Air Toxics "Hot Spots" Program Risk Assessment Guidelines*, Office of Environmental Health Assessment, March (http://oehha.ca.gov/scientific/acuterel.htm).

6.Develop a method to screen for cumulative exposures in the Initial Screening Step.

The initial screening step should take into account the potential for aggregate risks and hazards from contemporaneous exposures to multiple carcinogens and noncarcinogens.[1] One way to do this is to use the maximum concentration found or estimated within the study area and to compare it to an individual chemical concentration that is set at a level which, in and of itself, accounts for the potential for multiple chemical exposures. For example, carcinogenic screening numbers could be set at a level of 1E-06 and noncancer screening numbers could be set at a hazard quotient of 0.1. These values are selected for the following reasons:

Carcinogens: The level of 1E-06 is selected since it would take simultaneous exposure to 20 chemicals all present at a level of 1E-06 to collectively reach a cancer risk of 1E-04, the commonly accepted upper end of acceptable risk. Since this would be an unlikely situation, the screening level of 1E-06 is a reasonable and conservative starting point for the screening process.

Noncarcinogens: The hazard quotient of 0.1 is selected since it would take a simultaneous exposure to 10 chemicals all present at a hazard quotient of 0.1 to collectively reach a hazard index of 1, the commonly accepted upper bound for noncarcinogenic chemical exposures. Since the toxic effects of noncarcinogens range widely across a variety of metabolic mechanisms and target organs, it is unlikely that one would be contemporaneously exposed to 10 chemicals all present at a hazard quotient of 0.1 and all exerting the same toxic effect. As such, the screening level of 0.1 for an individual hazard quotient is a reasonable and conservative starting point for the screening process. Similar to the screening of carcinogenic chemicals, the maximum concentration found or estimated should be compared to the screening value in this first screening step. (High priority)

7.Expand the methodology to include indoor air risks to provide a more comprehensive picture of air risks.

Whether or not to include indoor air risk is very dependent on the goals of the project. If a goal is to provide a more comprehensive picture of overall air risks, the stakeholders must understand from the outset that the sources and types of indoor air contaminants can be very different from those in ambient outdoor air. In addition, stakeholders must also understand that indoor air across a geographic region can be highly variable, making it difficult to assess

[1] We presume that the authors mean "cumulative" here to be the sum total of contemporaneous toxic exposures to carcinogens and noncarcinogens by the inhalation pathway. We suggest avoiding the use of this term since EPA is currently evaluating the concept of "cumulative risk" to include multiple pathways. Cumulative risk, in that sense, means a more holistic evaluation of risk than that posed by just one pathway.

in a representative fashion for inclusion in a comprehensive risk-based screening assessment. This is not to say that any assessment should not at least discuss the prevalence and effects of common indoor air pollutants (e.g., second hand smoke). (Medium to Low priority)

8.Incorporate GIS mapping to enhance the communication of the modeling and screening results.

This is an excellent suggestion and every effort should be made at the outset of a project to incorporate this vital tool in not only the analysis of data, but also its presentation. However, a note of caution is appropriate. It is very easy to put environmental and public health data on a map and draw conclusions. It is more challenging to put environmental and public health data on a map correctly and come to the correct conclusions. Factors as simple as the scale chosen for mapping data can have a strong influence on the ultimate interpretation. Extreme care must therefore be taken when deciding to map data using GIS. Ultimately, stakeholders must understand the limitations of GIS, the level of data that will be needed to draw supportable conclusions, and the high level of resource requirements (including necessary specialized technical expertise) before committing to using this tool. (Medium to High priority)

9.Are the partnership and community participation aspects of the screening exercise described in the case study and in the lessons learned section appropriate to achieve goal C? Could this screening exercise be used in other geographic areas to reach this goal? Can you identify any improvements or changes in the screening exercise that would help accomplish this goal?

The technical document and lessons learned section of this document do a reasonably good job of describing the process of identifying and including appropriate stakeholders in setting up, running, interpreting, and communicating a screening evaluation and results. While these activities are the important foundation for Project Goal C, this Project Goal is more prospective in scope. In other words, Project Goal C is really geared towards how to use the results of a properly carried out screening project to take action, not simply how to get people together to do a screening project. In that sense, this document does not meet the needs of Goal C, nor could it be used as an example for other communities attempting to meet this goal.

To achieve Project Goal C, stakeholders must all agree up-front to a plan of action that is dependent, in part, on the outcome of the screening evaluation. This is commonly done by developing a "Risk Management Plan" prior to performing any screening level work. The contents of such a plan can include information on acceptable risk levels, guidelines for voluntary pollution prevention activities, funding and education to enhance stakeholder involvement in carrying out these actions, and strategies for sustainable development that meet the need to maintain a health environment. The Plan may even go as far as to envision changes in existing statutory or regulatory authorities to effect environmentally beneficial results. Ultimately, the plan can say anything the stakeholders want. However, having such a plan and obtaining buy-in from all affected parties *prior to beginning*

the screening process will form the basis for Project Goal C to be achieved. The current document appears to include very little of what could be described as a risk management plan. (High priority)

SPECIFIC CHARGES

1. The Emissions Inventory. Were the inventory of sources and the release and monitoring data used in the Baltimore screening exercise sufficient and appropriate to reach the goals of the committee? Should additional sources be included in a source inventory to expand the scope of the methodology for use in other communities?

See responses to 2a and 2b under General Charges above.

2. The initial screen: (a) Were the methods for calculating airborne concentrations, potential dose, and risk appropriate and scientifically justified? (b) Were the screening criteria that applied to identify chemicals for further analysis appropriate?

a. The method selected appears to be reasonable for calculating airborne concentrations, potential dose from a predicted concentration, and risk/hazard. However, comments given elsewhere in this review should be taken into account to refine the method to make it more justifiably conservative as a first step in a tiered screening approach. For example, noncancer doses should be compared to a HQ of 0.1, not 1.

b. As noted elsewhere, a modification of the screening criteria would make this initial step more conservative and more appropriate.

In addition, there are several troubling statements in the document regarding the addition or deletion of chemicals based on "professional judgment" (see pp. 30-31). Such decisions must be thoroughly documented so that anyone may see the precise logic behind the decision. For example, consider the phrase (p. 30) "Aldrin, acrylamide,….were not selected for further evaluation…because the professional judgment of the Committee determined that the chemicals did not present a risk to the community." A stakeholder not involved in this decision would be quite justified in questioning this statement (given the lack of supporting documentation). Also, while there is some logic to including chemicals for which there is no toxicity data, one could also make the argument that refining their airborne concentrations by modeling is an extraneous exercise since one still does not know what such refined concentrations mean toxicologically. The document should discuss this uncertainty.

3. The secondary and the final screen: (a) Was the modeling approach for developing estimates of neighborhood concentrations from multiple sources technically sound? (b) Were the

screening criteria that were applied appropriate? (c) Were the assumptions built into the Region III risk-based concentrations appropriate?

a. Based on my more limited knowledge of modeling, the approach appears to be technically sound with the caveat that the document is extremely ambiguous on how and why the receptor grid system and selected receptors were selected. For example, why was a coarse grid system even contemplated (since it was not subsequently used) and how were the receptors points that represent the four neighborhoods selected (are they located at census tract population centroids, near sensitive subpopulations, etc.?). Also, are the modeled concentrations used in the screening at a grid receptor the aggregate concentrations from all sources? What was compared to the screening level (the maximum annual aggregate concentration at a receptor)? Where is the monitoring station on the receptor grid and was this also selected as a modeling receptor point?

b. The screening criteria could be appropriate had they not been juxtaposed with a different set of screening criteria in Step 1 (different toxicity values, etc.). For example, the Region 3 RBC values are commonly used for screening contaminant levels in environmental media and are appropriately used in this evaluation. However, they include a set of presumptions about exposure that are logically inconsistent with the screening criteria used in Step 1 (presumably the most conservative step). Specifically, Step1 presumes an adult exposed for a lifetime. The RBC values, on the other hand presume (for carcinogens) a person exposed for only a portion of a lifetime (30 years), part of which is exposure as a child and part as an adult. Apparently the Committee intended to deal with this inconsistency by dividing the RBC values in half. While dividing a carcinogenic RBC value in half gives a value approximately that of assuming an adult exposed for a lifetime, for noncarcinogens the same operation gives a screening concentration that is half that of the Step 1 screening values. This is because, for noncarcinogens, the exposure duration term cancels out of the hazard equation (i.e., the length of exposure is irrelevant). Thus, the Committee has selected, for noncarcinogens in Step 2, screening values that are twice as conservative as those of Step 1. And Step 1, by definition, is supposed to be the most conservative step.

   One way to correct this inconsistency would be to reconstruct the overall screening process as follows:

   (i) Select a conservative set of screening values (e.g., the Region 3 RBC values).

   (ii) Use these values at a level of 1E-06 for carcinogens and one-tenth their value for noncarcinogens (to account for possible contemporaneous exposure to multiple noncarcinogens that have the same mechanism of action or affect the same target organ).

   (iii) Calculate concentrations as described in Step 1 (i.e., using Turner's method) and compare the MAXIMUM concentration found or estimated in any airshed to the screening level. Keep only those chemicals that fail the screen.

(iv) Perform modeling as in Step 2 on those chemicals that failed the initial screen. Compare concentrations at selected receptor points and monitoring stations to the SAME screening levels used in the initial screen. Keep only those chemicals that fail the secondary screen for any given airshed.

(v) Use refined modeling to compare the failing chemicals to the SAME screening levels used in the initial screen. The chemicals that continue to fail are then the ones targeted for reductions.

Ultimately, such a screening methodology maintains a consistent set of toxicological values to derive screening levels at a set level of risk or hazard (all conservative since this is still only a screening method – not a risk assessment). One simply refines the actual concentrations in air from conservative to more realistic. In addition, one may also build in the option to use modeling results at a monitoring position, rather than the monitored values themselves, depending on site specific circumstances (e.g., problems with the credibility or age of the monitoring data).

c. The assumptions build into the Region 3 RBC values are reasonably conservative and generally appropriate for screening programs such as the one described in this document. However, the values should be reevaluated as we learn more about exposure patterns and responses, or have reason to believe that the exposures presumed by the RBC methodology are not protective for a particular site. For example, the RBC table presumes an exposure duration of 30 years (based on residency evaluations). If a particular population is known to be less mobile than that presumed by the RBC methodology, alterations to that methodology (i.e., to derive more strict screening values) would be in order.

4. Does the draft Committee Report (see Appendix J) adequately and accurately describe the screening exercise and its results?

With a few exceptions, the Committee Report and the technical document are consistent. However, we suggest addressing the following points:

a. Appendix J indicates that only carcinogenic screening values were used in the screening process. This was not the case.

b. Appendix J also tends to give details not present in the technical document. If anything, the technical document should include everything in Appendix J. For example, Section 5 of Appendix J indicates that the model was used to determine chemical specific aggregate concentrations at grid receptors. The technical document is more ambiguous on this point. Likewise, Appendix J goes into details about what is being done, say, on the national level about air emissions, whereas the technical document provides less detail on this point.

5. Is the screening methodology as used in Baltimore sufficiently protective of sensitive populations? Please suggest any improvements of this aspect of the screening methodology.

With the modifications suggested elsewhere in this comment document, the Baltimore evaluation could be sufficiently protective of sensitive populations. For example, the modeling efforts should much more clearly define why grid receptors were chosen where they were. If these grid receptors do not include the locations of sensitive subpopulations, any new evaluation should be augmented to include the locations of such populations located in the study area (i.e., day care facilities, schools, nursing homes, and hospitals).

ADDITIONAL COMMENTS

1. The technical document suffers from a critical lack of detail in both the both the logic of the selected screening process as well as the scientific basis for the methodology. While a verbatim recitation of standard technical detail and policy is not necessary, sufficient citations to relevant texts are, and there are virtually no citations in this document. In short, anyone should be able to pick up this document and be able to understand exactly how the authors arrived at their conclusions.

   Carol Browner's policy on the development of Agency risk characterization[2] intimates that all such Agency documents must be clear, transparent, reasonable, and consistent. While the Baltimore methodology does not present a "risk characterization" per se, it should nevertheless meet the spirit of the risk characterization policy. As such, it is suggested that this document be rewritten with an eye towards including substantially more detail.

2. There are a number of examples of risk screening methodologies that have been evaluated and tested, but which are conspicuously absent from this document. Indeed, there is the appearance of this methodology having been developed quite de novo. We suggest that the authors review alternate methodologies and include a thorough discussion of these methods in the text of the technical document. The purpose of such a discussion would be to show that the developers of this methodology reviewed and understood the existing literature on the subject of environmental screening methodologies and adapted it to the specific needs of the Baltimore study. Some example methodologies that provide insight into the environmental screening processes include:

   - Guinnup, David E., *A Tiered Modeling Approach for Assessing the Risks due to Sources of Hazardous Air Pollutants*, USEPA Office of Air Quality Planning and Standards (EPA-450/4-92-001).

[2]USEPA (1995), *Policy for Risk Characterization at the US Environmental Protection Agency*, Office of the Administrator, March 21.

S *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites,* American Society for Testing and Materials (E1739-95e1), West Conshohocken, PA, 1999.

2. Page 17, first paragraph states that the partnership area included ZIP codes 21225 and 21226, but then goes on to include 8 additional ZIP codes. We suggest clarifying the exact boundaries of the study area and highlighting it on a map.

3. Page 17, the first paragraph indicates that permitted facilities and TRI facilities were used to make the final list of master facilities. We suggest describing the types of facilities that require permits under Maryland law. As written, one is left wondering whether there are numerous unpermitted facilities, the emissions from which (collectively) could amount to a large portion of the overall environmental load.

4. We suggest including a table that summarizes the emissions inventories that were queried, the type of data available (i.e., chemicals reported and type of emissions data such as total pounds released per year, etc.), the years data was available, the specific data element that was ultimately used in the screen, and a rationale for inclusion in the analysis. For example, if TRI data was available for multiple years, which year was used in the screen and why?

5. The discussion related to the Fairfield monitoring site (page 30, first full paragraph) indicates that 4 years of data have been collected from which annual average, minimum, and maximum concentrations were available for 41 different chemicals. Which year was used in the screen? Which value was compared to the screening value? The maximum? The annual average? (NOTE: The use of the maximum monitored values or estimated value for any source is particularly important in Step 1 of the screening methodology, since aggregation of source contributions is not performed.)

6. The text of the technical document often provides a range of years for which data is available, but for which the analysis apparently focuses on just one year. For example, the first full paragraph on page 19 indicates that ambient air monitoring data from the five Baltimore sites for 1992-1996 were compared to the monitoring station in the partnership area (in Appendix J). A review of Appendix J, however, shows that this analysis was for only one year (1996) and only 4 chemicals.

7. We suggest clarifying the text to indicate that the screening value at a grid receptor is the sum total for a chemical from all modeled sources. This is not clear in the document.

8. Page 27, sentence beginning "A very conservative estimate…," this paragraph indicates that an inhalation rate of 1 m^3/h is presumed. However, the document then goes on (in the highlighted box on page 28) to state an inhalation rate of 20 m^3/d. The second inhalation rate (i.e., 20 m^3/d) is correct and should be used consistently throughout the analysis for adults.

9. Page 40, the section on grouping chemicals according to "similar organs or physiological systems" needs to be reconsidered for the following reasons:

- **S** Apparently only respiratory and neurological effects were evaluated (with the neurological evaluation missing from Appendix I). Any analysis of the disaggregation of hazard indices should consider the full range of mechanistic and target organ effects. There is no rationale provided for the selection of these two effects or whether these are even the critical effects for the chemicals evaluated.

- **S** The "target organ effect" analysis is generally only used in the determination of whether hazard indices in a risk assessment should be disaggregated based on mechanism or target organ effect. What apparently has been done here is to compare modeled concentrations of chemicals exerting similar toxic effects to screening levels to determine if they exceed (in aggregate) these screening values. In concept, such a comparison can only be made comparing doses to toxicity metrics (RfDs) to derive a hazard quotient. The additivity of the various hazard quotients is an assessment based on mechanism of toxicity or target organ effect.

  Appendix I indicates, however, that comparisons of doses have been made to a variety of screening levels, some of which are not toxicity metrics (e.g., sulfur dioxide is compared to the National Ambient Air Quality Standard - NAAQS - for this compound). This results in the development of hazard quotients and pseudo-hazard quotients which cannot be added using the hazard index methodology. Adding such values together leads to an entirely erroneous result. It is suggested that the authors either consult a toxicologist with demonstrated experience in the application of the principles of the hazard index methodology or drop the analysis from the document entirely.

  The above discussion highlights a related problem that recurs throughout this analysis: namely, an undocumented selection of toxicity and pseudo-toxicity metrics and the use of screening values which are not toxicity metrics to quantitate risk or hazard. As noted previously, NAAQSs are not toxicity metrics and cannot be used as such. Neither are ACGIH TLVs divided by an uncertainty factor (sulfuric acid), nor ATSDR MRLs.[1] We suggest reevaluating the basis for toxicity metric selection and to apply it consistently throughout the document.

  Please note that none of this is to say that concentrations should not be compared to non-toxicity metric screening levels. For example, comparison of air concentrations to the NAAQS is not only permissible, but desirable. The point is that such an analysis cannot be subsequently used in assessing hazard quotients or additivity of hazard quotients using the hazard index approach.

[1] ATSDR MRLs can theoretically be used, under limited circumstances, as a toxicity metric due to the similar nature of their development to EPA RfDs. However, a justification must be made for such a use, and the uncertainties of the analysis documented.

10. Table 3 on page 46 indicates "NA" for a number of secondary screen emission rates which have final screen emission rates. How can this be? If the final screen is a refinement of the secondary screen, the secondary screen should have emission rates for all of these chemicals.

11. Table 4 on page 48, we suggest discussing why some of the estimated concentrations in the final step are higher than estimated concentrations from the secondary screen. One might presume that, given the supposed increasing conservativeness of the screen steps as one goes from Step 3 to Step 2 to Step 1, that Step 3 estimates might be less than those of Step 2. We also suggest adding the three monitored chemicals to this table to make it more comprehensive.

12. We suggest making the screening methodology flexible when determining whether to move from one step to another. Generally, screening methodologies of this sort may or may not complete all steps, depending on site-specific circumstances. For example, the initial screen might clearly point to one source as the primary emitter of concern. Spending more time and money on screening would probably not change that conclusion. In this instance, stakeholders might decide to take action after the first step and drop any further analysis.

13. Page 62 indicates that one lesson learned would be to verify modeling results with monitoring results. Performing this analysis should not be a lesson learned for this document. Rather, it is crucial that this analysis be done for this version of the document since this is the primary way, in this study, to "ground-truth" the estimates from the model.

14. For the Fairfield monitor, the document should state whether it is a source-oriented monitor or a community-based monitor. A source-oriented monitor is positioned specifically to determine whether a particular source is affecting a particular population. A community-oriented monitor is positioned so as to provide readings suitable for estimating exposure over a larger geographic area (e.g., a large urban area). This same comment holds for the other Baltimore area monitors mentioned in Appendix J.

15. We suggest reviewing Appendix G for accuracy. For example, cancer slope factors are given as mg/kg-d rather than $(mg/kg\text{-}d)^{-1}$. We also suggest removing extraneous information that is not used in the screening process (e.g., the waste minimization prioritization tool - WMPT – information).

16. Appendix I, Table 1, the "Screening Comparison Concentrations" are not one-half of the Region 3 RBC values, as indicated in the text. For example, the screening value for ammonia is given as 100 ug/m^3. One-half the RBC value is 50 ug/m^3. We suggest revising this Appendix and the text to match. (Also note that there are not similar screening comparison tables for Steps 1 and 3, but there should be.)

    We reiterate an aforementioned comment here, given how crucial it is to the overall success of the screening process. Table 1 of Appendix I illustrates that there is little documentation or justification for the selection of screening levels (for any of Steps 1-3) or how they are applied. We strongly suggest revisiting this question and revising the methodology accordingly.

17. Appendix J, Numbers 9 and 13 should be enhanced to more fully describe the Clean Air Act requirements to address air toxics in urban air, including a more thorough discussion of MACT standards, the residual risk program, cleaner fuels, etc.

18. Appendix K, the discussion of the modeling provided in this Appendix does not match the text of the body of the technical report (e.g., the text does not talk about multiple modeling scenarios).

Why were the 5 years for modeling (1987-1992) selected instead of more recent years? Were the results from these different modeling years evaluated separately or combined in some way?

19. What was the rationale for the selection of the discrete neighborhood receptors (e.g., Cherry Hill at a given lat/long)?

20. The document should include a much more full description of the airsheds and meteorology of the area. Basic information such as windroses is missing from the document and should be included to frame not only the problem, but also for use in developing appropriate solutions.

21. The document should include a thorough analysis of uncertainties associated with the assessment and their effect on the analysis outputs. Only by including such an analysis can one determine whether decisions can be made with the current level of analysis or whether additional work must be performed (to reduce existing uncertainties) before any risk management decisions can be made.

Peer Review Comments

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Overall Comments

The document presents a tiered approach to evaluating community risk due to modeled levels of air contaminants in neighborhoods of southeast Baltimore City and contiguous Anne Arundel County, Maryland. The approach begins with a screening list of chemicals of interest from TRI and state release inventories, and an inventory of fixed facilities in the area that might emit those substances to air. Then three successive air quality modeling and constituent screening exercises are carried out to calculate potential incremental health risks in the neighborhoods being studied. The resulting calculations showed that only benzene was identifiable as being both currently emitted from the inventoried fixed sources, and posing a potential air concentration above the risk-based concentrations used for screening levels of concern. The remaining three chemicals were identified as not being due to emissions from current fixed sources (1,3-butadiene, methyl chloride, and carbon tetrachloride).

The general approach taken seems reasonable, although there are significant gaps in the information provided about the conclusions reached. In particular, no explanation is given for screening or higher level analyses of chemicals whose primary exposure route of concern is ingestion or other non-inhalation pathways. Although both dioxins and mercury, for example, are listed as having been selected in Level 1 screening because of risks levels of concern (hazard quotient > 1 or cancer risks > 10^{-6}), these chemicals are of concern primarily by ingestion routes indirectly through foods. In particular, dioxins are lipophilic, so are of concern due to ingestion of meats and dairy products, while mercury requires fish ingestion. Yet no discussion is provided of the manner in which screening risks were calculated for these chemicals. Nor is any discussion provided of whether these chemicals arise from local sources, or from “ambient” levels (levels in background media with no attribution to local sources). Thus it is not clear about how such chemicals can be screened in or out of the subsequent analyses.

Although the approach is reasonable, its limitations make it of limited value. The lack of congruence between the methodology results and the monitoring data is disturbing. It suggets that the results of the current methods are of questionable value.

General Charges

1. I don't believe that these goals were met. The greatly limited emissions inventory would not allow any reasonable assessment of community health impacts. It is imperative to consider mobile sources, volatile emissions from landfills, etc. and small sources. Each of these has potential to contribute significantly to community risks. Analyses by EPA (1990) indicate motor vehicles and related activities (fueling & fuel processing) may account for about 75% of their calculated excess cancer cases nationally, or 75% of 1,700 to 2,700 cases annually. Since then, the unit risk for 1,3-butadiene has been re-evaluated and cut by a factor of about 3, but it is likely that other fuel constituents play a significant role that was unaccounted for in 1990. One reason given for the meaningful divergence between the monitored values of 1,3-butadiene, methyl chloride, carbon tetrachloride, and benzene is the potential emissions from wastes sites and landfills. If these emissions are sufficient to be monitored and trigger risk concerns, they cannot be ignored. Small sources could also be important. I'm not sure that the current methodology, for example, would capture the impact of a small dry cleaning establishment whose emissions of perchlorethylene might reach immediate neighbors.

Without any reasonable characterization of risks, the methodology is of little value in aiding the development of risk-based priorities.

The most important conclusion that I make from this exercise is the importance of monitoring. The method did not identify the greatest potential risks; monitoring activities did. I would urge the expansion of monitoring to include other sites and a full suite of toxics about which there is concern. This has far higher priority than the extension of a methodology whose results to date are not validated by monitoring data.

If the methodology is to be extended, the most important improvement is the development of a comprehensive emissions inventory. See my comments above. This is not an easy task for the sources currently missing; perhaps community involvement could help here.

To be consistent with other EPA studies, toxicity data should be from the IRIS database. It should be recognized and communicated to the community that the unit risks and RfDs/RfCs are conservative numbers designed to be protective; risks derived from them are upper limits. The IRIS numbers, however, are based upon a thorough (although sometimes out of date) review of the literature and their derivation is well-articulated.

Short-term acute effects could be important; their consideration need also includes potential accidents, which would require all types of probabilistic assumptions. The consideration of acute effects and exposures would also present modeling problems. I would urge the study group to estimate the chronic risks correctly before venturing off into an even more difficult area.

The EPA risk assessment guidelines (and the data and methods applied) make provision for sensitive individuals. Unless there is good reason to suspect that these are not sufficiently protective for the population under study, I would not revise them.

I would give lower priority to applying GIS mapping systems and cumulative exposures until we have far more confidence in the existing results.

I would ignore the indoor environment; this would require too many assumptions and would not be appropriate for this study. Where the indoor environment would mitigate ambient concentrations may be of interest, however. For example, SO2 and ozone are both adsorbed on indoor surfaces; hence, indoor levels of these pollutants are far lower than outdoor concentrations.

It is difficult to evaluate goal C from the materials provided. Clearly there must be scientific confidence in the results of the screening study. I don't have confidence in these results at present; the divergence of the results of the screening exercise and the monitoring program do not provide confidence in the results. The lack of any clear explanation of how to interpret the results of the study to the community is also a detriment. The study is seriously limited because it ignores many potentially important sources; on the other hand, it employs a very conservative methodology that will overestimate risks. Neither of these are clearly communicated in the report. I believe that this is necessary to obtain the respect of the community.

Specific Charges

1. See my comments above. I believe that the current inventory was neither sufficient nor appropriate.

   The initial screen was reasonable for large sources. I'm not sure if it would have captured the hypothetical dry cleaning establishment that I mentioned above. These smaller sources may be more important because they are emitted at ground level.

   The above could also apply to the secondary and final screens. There should have been greater attempts to understand the discrepancy between the results of these screens and the monitoring data.

   Appendix J provides an accurate description of the process.

   The methodology as applied in Baltimore is of limited value; it ignores potentially very important sources; it does not provide results which are consistent with monitoring data. It applies very conservative methods to a few well-defined sources. See some of the specific comments below which indicate areas where the methodology could be made less conservative and still be protective. Before this methodology is applied elsewhere, it needs to be improved and shown to agree with the results of monitoring data in Baltimore.

Specific Comments:

Pg. 9, second bullet	"The actual risk …". The use of the term "actual" is imprecise and nonstandard for risk calculations. The word "actual" is used throughout the paragraph. It would be more correct to state that "The site-specific potential risk based on field measurements of concentrations … could not be determined."
Pg. 24, last paragraph	The definition of a Reference Dose should be expanded a bit to make it clearer. The units of an RfD need a bit of explanation; it refers to dose in mg *of the substance of interest* per kilogram *of subject's body weight* per day.
Pg. 25, first full paragraph	The example given for cancer risk, $6 * 10^{-4}$, seems unusually large when all of the results arrived at later are 2 orders of magnitude or more lower. Suggest $6* 10^{-7}$ as a more relevant example.
Pg. 29, table	The table carries too many significant figures for a risk assessment; last two columns should not display more than 1 or, if it is important to distinguish between outcomes, 2 significant figures.
Pg. 40	The use of a 50% conservative multiplier for the EPA Region 3 risk-based concentrations (RBCs) seems unnecessary. The RBCs are calculated from EPA RfDs and CSFs, which in themselves have incorporated uncertainty factors of multiple values of 3 or 10. An additional conservatism in these screening levels appears superfluous.

Pg. 41 et seq.	The speciation of Chromium into Cr^{+III} vs. Cr^{+VI} is critical for the inhalation risk assessments. Yet no explanation is offered for the speciation used. In particular, the use of a 30% Cr^{+VI} fraction for the BG&E power plants is unexplained. If this is from direct measurements by BG&E, it should be so noted. EPRI data indicate that a more appropriate figure in general is about 15%; EPA in its utility air toxics report to Congress used an 11% Cr^{+VI} fraction for coal-fired power plants. Additionally, the fraction of Cr^{+VI} seems high for other sources as well.